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UGANDA PROTECTORATE.



ANNUAL REPORT

OF THE

DEPARTMENT OF AGRICULTURE

FOR THE

YEAR ENDED 31ST MARCH, 1916.

Published by Command of His Excellency the Governor.



ENTEBBE:

PRINTED BY THE GOVERNMENT PRINTER, UGANDA.

1916.

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DEPARTMENT OF AGRICULTURE.

					<i>P.O. Box</i> No.	<i>Telephone</i> No.
HEAD OFFICE	...	...	...	Kampala	...	53 15
VETERINARY OFFICE AND LABORATORY	...	...	...	Kampala	...	63 14
ENTOMOLOGICAL OFFICE AND LABORATORY	...	...	...	Kampala	...	5 25
BOTANICAL OFFICE AND LABORATORY	...	...	...	Kampala	...	5 26

EXPERIMENTAL PLANTATIONS:—

- | | |
|-----------------------|-------------------------|
| (1) Kampala | (3) Kadunguru, Bugondo. |
| (2) Kakumiro, Mubendi | (4) Fort Portal. |

ANNUAL REPORT, 1915-16.

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STAFF LIST.

DIRECTOR OF AGRICULTURE:

S. SIMPSON, B.Sc., (EDIN.), M.R.A.S.E., N.D.A.

GENERAL DIVISION.

District Agricultural Officers :

TYRRELL BRUCE ⁰ A. R. MORGAN ⁰

L. HEWETT, M.R.A.C. R. G. HARPER.

T. D. MAITLAND.

Assistant District Agricultural Officer ... J. D. SNOWDEN.

Stock Farm Manager ... J. S. HARMSWORTH. ⁰

Ploughing Instructor ... (VACANT)

BIOLOGICAL DIVISION.

Entomologist ... C. C. GOWDEY, B.Sc., F.E.S., F.Z.S.

Botanist ... WM. SMALL, M.A., B.Sc.

VETERINARY DIVISION.

Chief Veterinary Officer ... E. HUTCHINS, M.R.C.V.S.

Veterinary Officer ... U. F. RICHARDSON, B.Sc., M.R.C.V.S.

Temporary Veterinary Officers :

R. L. L. HART, M.R.C.V.S. W. F. POULTON, M.R.C.V.S. ⁰
(VACANT)

Stock Inspectors :

F. A. POESTKOKE. H. L. LEMON. H. A. STRAUSS. ⁰

Indian Veterinary Assistants :

H. RAHMATULLAH. FAKHAR-UD-DIN. FAZAL-UD-DIN AHMEDI.

CLERICAL STAFF.

Clerks :

A. S. WIDGERY.

J. A. M. D'SA.

J. X. DE MELLO.

K. A. BAPAT.

ANNUAL REPORT
OF
THE DEPARTMENT OF AGRICULTURE,
UGANDA PROTECTORATE,

For the Year ended 31st March, 1916.

—:O:—

Staff.

Mr. Tyrrell Bruce, Senior District Agricultural Officer, was on local military duty throughout the year organising and commanding the Baganda Rifles, which have proved an extremely useful addition to the fighting forces of the Protectorate.

Mr. A. R. Morgan, District Agricultural Officer, joined the Baganda Rifles in March on local military duty.

Mr. J. S. Harmsworth, Stock Farm Manager, was on local military duty throughout the year, first in the Intelligence Department, but now transferred to the Baganda Rifles. He has been awarded The Military Cross for his excellent conduct at the defence of Kachumbi Post, German East Africa, on February 18th, 1916.

Mr. L. Hewett, District Agricultural Officer, went on leave on December 8th, 1915, and visited Ceylon and Southern India.

Mr. J. D. Snowden, Assistant District Agricultural Officer, returned from leave on October 1st, 1915.

Mr. C. C. Gowdey, Government Entomologist, returned from leave on June 14th, 1915.

Mr. W. Small, Government Botanist, went on leave on August 8th, 1915, his duties being undertaken by Mr. T. D. Maitland, District Agricultural Officer.

Mr. W. F. Poulton, Veterinary Officer, was on local military duty with the Southern Frontier Force throughout the year, as well as Veterinary Assistant Fakhar-ud-Din.

Stock Inspector H. A. Strauss, and Veterinary Assistant Fazal-ud-Din Ahmed, went later in the year on local military duties.

Mr. R. L. Hart, Veterinary Officer, was on duty with the military forces in British East Africa throughout the year.

Veterinary Assistant, H. Rahmatullah, was on leave from the 4th October, 1915, to 23rd February, 1916.

Stock Inspector F. A. Poestkoke's agreement terminated on the 17th February, 1916.

General.

Owing to the war, the prevailing conditions for carrying on trade and agriculture have been much more trying than in the previous year. Skeleton staffs only have been available, whilst consignments of produce have taken months to reach the Coast. This delay often means deterioration and loss, but always a heavy financial burden, to which must be added the storage charges for delays at the port, and increased shipping freights. Large demands have been made on the native population for military duties, which made extra efforts necessary to keep the staple industries going, although development work is practically moribund. The climatic conditions throughout the year have been favourable.

Cotton.

It may not be generally known that this crop is the most important agricultural and economic product of the Protectorate, a position there appears every likelihood of being maintained for the next twenty years. An estimated capital value of four million pounds sterling has been placed upon the cotton industry, which has been carefully built up and fostered by the Government.

Buying and ginning are done entirely by traders, which accounts, to a large extent, for the serious temporary set-back the industry received last year, when cotton was practically unsaleable for over six months. This dislocation made seed for sowing purposes unobtainable for a considerable time, with the result that the area cultivated was much less than in the previous season, and a large proportion of that was planted much too late to give an average yield.

The following table illustrates this point. The figures are approximate only, but a check is kept upon them by the quantity of seed distributed:—

Year.	Total Area under Cotton.	Increase.	Decrease.
	ACRES.	ACRES.	ACRES.
1911-12	60,920	—	—
1912-13	50,100	—	10,820
1913-14	110,264	60,164	—
1914-15	118,778	8,514	—
1915-16	92,127	—	26,651

Cotton Exports.

The value of the cotton exports at port of shipment, for the year 1914-1915, was £351,146, and the quantity of ginned cotton was 107,139 cwts., and seed cotton 30,188 cwts.

This year the value was £245,426, and the quantity of ginned cotton 91,231 cwts. and seed cotton 8,110 cwts. The decrease in value was thus over £100,000, accounted for, in a large degree, by the lower prices of valuation, but a serious item for a country the total exports of which ten years ago were below this figure. Even as late as 1908-1909, the total annual value of the country's exports of domestic produce was only £127,275.

The decrease in quantity was not so pronounced, being 15,908 cwts. of ginned cotton, and 22,078 cwts. of seed cotton; the latter figures shewing that Uganda ginneries are handling nearly the whole of the crop.

The bulk of the exports is destined for the United Kingdom, but India took over 9,000 cwts. last year, and I am informed that Bombay spinners are so highly satisfied with the cotton, that there is a probability of India becoming a regular customer.

The Sale of the Crop.

Eighty-eight Licences to purchase raw cotton were issued during the season against an estimate of 30, and this fact shews that the demand for the crop was very keen, and therefore, prices realised were uniformly good. The markets were opened in the Teso District on the 10th January. Last season not a single pound of cotton could be sold in the Kidongole market in Teso, whilst this season 520 tons realised good prices. Kumi market was in a more favourable position, although no cotton was sold before the 16th April last season, and even then, at the low prices ruling, after only three days sales buying could not proceed owing to lack of specie. The direct result has been that instead of 1,000 tons being on offer at Kumi, only 722 tons were sold there this season. It is worthy of notice that from the 10th January to the 18th March, the growers in the Teso District sold 5,099 tons of cotton, and of this quantity 3,345 tons were delivered direct to the ginneries by the growers themselves. After last season's experience it is really surprising that so much cotton has been produced, and conclusively proves that the crop is well established.

Cotton Seed Distribution.

The seed distribution at present being undertaken constitutes a record in both the Eastern and Buganda Provinces. The extension of the industry in the Eastern Province, where three-fourths of the cotton is grown, has been remarkable, accounted for by several factors, such as, suitability of soil and climate, the presence of a large and industrious population, improving transport facilities, but mainly by efforts made to enable the growers to effect a quick and ready sale by establishing cotton markets.

This season's sowing is expected to be well over 100,000 acres, and it is entirely a native industry. The quantity of seed distributed up to date is approximately 350 tons.

Handling of the Cotton.

No matter how much care and attention are devoted to the growing, selection and distribution of cotton seed likely to produce a high class lint, these efforts avail nothing unless the crop is properly handled. Ample storage accommodation is a necessity, as exposure to the weather ruins both the colour and the staple. Ginners are again reminded that clean white cotton is readily saleable, and that colour is a most important factor.

Stained cotton is generally preferred after saw-ginning, which is both cheaper and quicker than using roller gins.

After the war, the export of seed cotton from Jinja, Port Bell and Entebbe will be stopped, and thus the cotton will be dealt with in local ginneries, saving much unnecessary handling and transport.

Transport Facilities.

Early in the year the steamer "*Speke*," of the Busoga Railway Marine, sailed to Gogonyo, and was able to transport a fair amount of last season's crop. The Bukedi District thus becomes possessed of a port and the facilities for water transport to one of the largest cotton producing areas in the Protectorate.

The facilities for the transport of cotton from the Kumi and Bukidea Counties of Teso District have undergone very little improvement during the last four years, and there is still no through method of communication with an open water port at which steamers can call. This makes a considerable congestion at Agu during the cotton season, whilst consignments from Agu of seed cotton and half-pressed bales, after being several days in leaking canoes on the Sambwe channel sometimes arrive in a deplorable condition at Bugondo, with the seed sprouting through the bags containing the seed cotton, and two or three inches of wasted lint round each half-pressed bale. This means a heavy monetary loss to buyers, and damages the reputation of the cotton. It is expected that work will be done in the coming year to improve this waterway.

An Indian trader is placing a small power-launch to work on this channel.

Quality of the Cotton.

Uganda cotton is of a high standard when marketed in good clean condition, and an average price of 120 to 130 points on Middling American can be confidently expected, whilst some consignments realise 150 points on, with occasionally better prices for odd lots. There is, however, far too large a proportion of the exports stained and injured by exposure to the weather, and this has a very detrimental effect, not only on the average prices realised, but stultifies the efforts made to widen the market for Uganda cotton.

Nine samples of cotton grown on the Government Plantation, Kadunguru, Bugondo, were sent to Messrs. Wolstenholme and Holland, Liverpool, who reported as follows:—

“Nos. 1 and 9 are much better in colour than the general run of cotton from Uganda, but they are not overdone in staple. The other lots are all excellent, and if you can keep up the colour and the length of staple in quantity, we have no doubt the basis we have put upon the cotton could easily be exceeded. Our difficulty with Uganda cotton is that it contains so much stain as a general rule, which limits the market.”

The classification and valuations of the nine samples based on March to April Futures at 7·60d. were as follows:—

No. 1, 9·40d. to 9·60d.	Roller, good colour, staple $1\frac{3}{16}$ ", little irregular.
No. 2, 10·10d.	 Roller, very good colour, staple $1\frac{5}{16}$ ".
No. 3, 9·80d. to 9·90d.	Roller, good colour, staple $1\frac{5}{16}$ " but wasty.
No. 4, 9·60d.	 Roller, good colour, staple $1\frac{3}{16}$ " to $1\frac{1}{4}$ " but irregular.
No. 5, 10·10d.	 Roller, good colour, staple $1\frac{5}{16}$ ", little wasty.
No. 6, 9·40d.	 Roller, good colour, staple $1\frac{3}{16}$ ".
No. 7, 9·80d. to 9·90d.	Roller, very good colour, staple $1\frac{1}{4}$ ".
No. 8, 10d. to 10·10d.	Roller, good colour, $1\frac{1}{4}$ " to $1\frac{5}{16}$ ".
No. 9, 9·40d.	 Roller, good colour, staple about $1\frac{3}{16}$ ".

Ginning Percentages.

The percentage of lint to seed cotton varies from season to season and in different localities. The tendency is for it to be low in the Eastern Province, whilst Buganda Province is above normal for such a high quality of lint.

Three ginneries in the Eastern Province gave figures of 28·08%, 29·18% and 30·36%, whilst another factory which handled over a million pounds of seed cotton had an average ginning percentage of 31·56%.

Every effort is being made to increase the ginning percentage of our cotton. The details of a very carefully conducted test on this subject by Mr. W. E. Holl, of the Bombay-Uganda Syndicate, Rappayi, Soroti, are given below. The cotton experimented with was from Soroti County. No delinting machine to clean the seed was available, but apart from the usual fuzzy appearance of the seed, very little lint that could have been removed by ginning was mixed with the seed:—

Factory equipment	... 12 single action roller gins and one double seed cotton opener.
Time of starting test	... 6-35 a.m.
Time of finishing test	... 11-24 a.m.
Duration of test	... 4 hours and 49 minutes.
State of weather	... Light clouds, fine, heavy dew in early morning.
Mean shade temperature	78°F.

Seed cotton taken direct from storage shed, weighed and delivered to opener without being sun-dried.

	lbs.	%
(1) Total weight of seed cotton weighed into factory... ..	6,738	—
(2) Sand, grit and dirt extracted by opener	65·5	0·972
(3) Cotton seed—woolly	4,627·5	68·677
(4) Cotton lint	2,006·5	29·780
(5) Dust, immature cotton and fine lint blown up opener chimney and evaporation of moisture—unweighed ...	38·5	0·571
	6,738	100%

When we deduct the known weighed quantity of sand, grit and dust extracted by opener, the following percentages are obtained:—

	lbs.	%
(1) Seed cotton 6,738—65·5 lbs ...	6,672·5	—
(2) Cotton seed—woolly	4,627·5	69·3517
(3) Cotton lint	2,006·5	30·0713
(4) Dust and moisture—unweighed ...	38·5	0·5770
	6,672·5	100%

The true ginning percentage was therefore just over 30% only.

The production of each gin during the test is shewn in the table:—

Total number of gins in factory	12.
Average number worked during test	11·4.
Total quantity of lint ginned... ..	...2,006·5 lbs.
Average lint per gin per hour... ..	... 36·84 lbs.

This is approximately the hourly average of production with native attendants feeding the gins as usual, although during special short tests to ascertain productive capacity, each gin produced from 45 to 48 lbs. of lint per hour.

Spinning Results.

As in the previous year, samples of cotton were sent to Mr. J. W. McConnel of the Fine Cotton Spinners and Doublers Association, Manchester, who kindly put them through spinning tests. He reports that "The cotton is "very inferior to ordinary Egyptian, but compares favourably with extra "stapled American." This is exactly the market we are trying to meet, and if possible to get spinners of such cottons interested in the Uganda crop.

Cotton Seed.

Only 5,225 tons of cotton seed were exported compared with 9,017 tons last year.

The seed is used largely for fuel in generating steam-power, and as the residue is rich in potash, planters have at their disposal a valuable manure for all crops. This applies also to the cotton seed itself, and to the crude cake.

A little more oil was expressed locally and exported than in the previous year.

Cotton seed is entirely used for generating suction gas in many of the cotton ginneries, and the production of power is thus very economical.

The export of cotton seed is largely dependent upon shipping charges, as it is a bulky and low-priced product.

Cotton Ginneries.

Bukedi District became possessed of a ginnery at Gogonyo during the year, and another is being built at Kumi in Teso District. Both are in excellent centres of cotton production, and will stimulate still further.

Small power ginneries with ample storage accommodation are recommended, and there are a few producing areas still untouched where their erection would benefit the industry.

Coffee.

Coffee maintains its position as the principal crop on European plantations, and it is also a favourite exportable crop grown by natives.

The rapid progress of the industry is clearly seen by the value of the exports being only £383 in 1910-1911, whilst last year the value was £87,202. I regret that there is no possibility of this rapid extension being maintained.

On European plantations 2,271 acres of *Coffea arabica* are under two years old, and 9,891 acres over two years, whilst the figures for the acreage interplanted with Para rubber are 238, and 4,509 acres respectively. It is estimated that 8,464 acres of coffee are being grown by natives, whilst the various Missions are responsible for 800 acres.

Pests on Coffee.

On reference to the attached reports by the Entomologist and Botanist, it will be seen that pests have been much in evidence during the year, although *Hemileia vastatrix* does not appear to have done much damage. Coffee is thus proving to be a very risky crop, more particularly in those areas where climatic conditions are not entirely suited to its cultivation.

Coffee Exports.

The bulk of the coffee is sent to the United Kingdom, but there is a tendency for some exporters to send increasing quantities to Marseilles. Both Egypt and South Africa are large consumers of coffee, and the markets there are worthy of consideration, particularly as the percentage of husked coffee exported, compared with parchment, is rapidly rising.

Local Coffee Curing Factory.

When Costa Rica, with its production of fine coffees, exports only half of its crop in parchment, the equipment and working of a local curing factory is of some importance.

A consignment of 7,912 lbs. of coffee grown on the Government Plantations was sent for treatment. The coffee was light and dry on delivery, weighing only 26 lbs. per bushel both before and after one hour's drying. After husking, cleaning and grading, the following details of the consignment were given for export:—

SIZES.	BAGS.	PACKED.		
		cwts.	qrs.	lbs.
A	12	17	3	25
B	7	11	1	14
C	10	14	3	14
P	3	3	1	11
T	2	2	3	25
TOTAL	34	50	1	23

The total weight lost in husking, etc., was 2,261 lbs., or 28·57 per cent.

The Future of Coffee.

In the more humid parts of the Protectorate, the life of the Arabian coffee tree is very short, so that *Coffea robusta*, which is indigenous, will probably be more largely cultivated, as its yield is both large and sure. In the drier and more elevated parts, Arabian coffee cultivation will gradually extend, particularly as planters are beginning to see that pruning and cultivation are necessary.

Our best new coffee growing area is on the foot-hills of Mount Elgon, where, at altitudes varying from 4,360 to 5,000 feet, 220 patches were planted in June, 1913. The first crop of 14 tons of parchment was picked during the year, with an average yield of parchment coffee per tree of over 1½ lb.

The quality of the coffee was good, and the bulk was marketed in a creditable condition.

Many varieties of coffee from all parts of the world are being tried by the Department.

Rubber.

Para rubber is the crop next in importance to coffee on plantations, the area being 1,072 acres over five years old, and 328 acres under five years, whilst in addition, 4,509 acres over two years old are interplanted with coffee, and 238 acres below that age, making 6,147 acres under Hevea. Natives are growing 1,062 acres of Para and 2,273 acres of Ceara, whilst the Missions have 169 acres of Para and 121 acres of other rubbers.

A comparatively small area only has reached the tapping stage, but the exports are rising gradually, being 52,349 lbs. this year compared with 22,056 lbs. in the previous year. The results obtained up to the present are decidedly encouraging. The crop suffers little from pests and diseases, and thus promises to become of considerable importance in agricultural development.

Small shipments from plantations have realised good prices.

Cacao.

Cacao growing is receiving increased attention, 159 acres only being over five years old, whilst 4,113 are under five years, and 689 acres have been prepared ready for cacao.

This crop has a number of serious insect pests and diseases, but with the necessary precautions being taken in suitable districts, the crop promises well.

A report by the Imperial Institute on a sample of cacao is given in Appendix No. 5.

The first consignment exported from the Government Plantation Kampala, realised eighty shillings per cwt.

Kampala Plantation.

A full account of the year's work is attached together with the details of experimental work done on the main plantation crops of the country.

This Plantation provides an adequate training ground for those desirous of obtaining a knowledge of crop growing and the preparation of the produce for the market, which is being more appreciated year by year.

The nurseries are well stocked, and many thousands of plants and seeds were distributed throughout the country during the year.

The labour supply was good, and thus all branches of work could be kept in a thorough condition.

Kadunguru Plantation.

This is primarily a cotton seed selection station, being situated in the largest cotton producing area.

Instructors are also trained here.

A few other crops besides cotton are cultivated which are suited to the prevailing conditions and worth encouragement either for the food supply or export.

A more central position near Soroti is being considered for this work, and a full report on the year's work is attached.

Kakumiro Plantation.

This Plantation is small but of great interest as possessing the oldest Arabian coffee, and nearly the oldest Para rubber in the country.

Subsidiary crops are also cultivated.

A report on the year's work is attached.

Fort Portal Plantation.

A small experimental plantation is being worked five miles from Fort Portal, the main crops being wheat and coffee, and it is hoped to make it a distributing centre for crops likely to be successful in that region.

A report is attached.

Native Agricultural Instructors.

Nearly one hundred natives have been specially trained as travelling instructors, and these are working in every District of the Protectorate. The instructors specialise in the crops suited to the District, such as cotton in Teso, coffee in Bugishu, wheat in Toro, rice in Bunyuli, rubber and cacao in Mengo, whilst in the outlying parts of the Protectorate they prove particularly useful in the introduction of new food crops.

Ploughing Schools.

The post of European Instructor remained vacant throughout the year, so natives only were employed under the District Agricultural Officers.

Teso District has made most progress, and it is estimated that the Chiefs possess nearly one hundred ploughs, a big proportion of which are in daily use. The question of repairs and spare parts for these ploughs has been, in the past, a difficult one, but it has been solved by a local ginning firm and Mission both taking up the matter, by executing ordinary repairs and stocking ploughs and spare parts.

An unsuccessful endeavour was made to introduce the use of ploughs amongst the Chiefs at Ekwera, in Lango, but a school will be started at Lira in the same district very shortly, with better hopes of being appreciated.

Introduction of Plants.

Seeds of various economic and decorative plants are regularly introduced from all parts of the world, but a special effort was made during the year when Mr. L. Hewett visited Ceylon and Southern India during his leave. He was thus enabled to collect personally seeds and plants likely to prove of advantage to this country.

Shade tree seed has proved particularly difficult to obtain in sufficient quantities, with the exception of *Erythrinas*, which unfortunately suffer from insect pests.

Plant Pests Board.

The constitution of the Board, appointed originally for Buganda Province only, has been altered, so that it now includes the whole Protectorate.

No pests were scheduled during the year, although it is hoped some of the more serious ones will be dealt with in the near future.

The periodical meeting together of planters, both European and Native, to discuss the various pests and diseases, examine specimens, and obtain the latest scientific information about them, must be of direct advantage to the community, and provides a method of spreading first-hand knowledge hardly possible by other methods.

Oil Seeds.

In addition to cotton seed, the principal oil seeds exported are sim-sim and ground-nuts.

Lango District has done extremely well with sim-sim, and the crop should be encouraged.

The exports of ground-nuts are very small, but it is an exceedingly useful crop, rotating well with cotton, and providing a local food supply in cases of scarcity.

A little sim-sim oil only is exported.

During the year, nuts from the Shea butter tree (*Butyrospermum Parkii*) from the Kitgum District were sent to the Imperial Institute, and are reported upon in Appendix No. 6.

The locally-produced oil called "Lulu Oil," from the same District, was also examined, and the report is given in Appendix No. 7, as well as Shea butter from the West Nile, reported upon in Appendix No. 8.

Chillies.

Owing to the rise in prices, increased attention to production has been given, more particularly in the Districts of the Northern Province, although our exports are less than two or three years ago. Prices and demand are very erratic, so the crop is not adaptable for production on a large scale.

Tobacco.

This crop, although promising well in the drier portions of the Protectorate, obtains little interest from planters generally, a small amount only being produced for local consumption.

Sugar Cane.

This crop is receiving more attention, and many new varieties have been introduced from various parts of the world for experimental purposes. At present it is chiefly grown in small patches by natives for consumption in the green state.

An Indian cultivates the crop on two estates, making unrefined sugar for local sale, a little only being exported.

Conditions are favourable to a considerable extension of sugar cane cultivation.

Rice.

Further efforts have been made to extend rice cultivation during the year with some success, particularly in Bukedi and parts of the Northern Province.

The local demand for rice is good, and there is every reason to hope that this will be satisfied in the coming years by local production.

Wheat.

Two water-power grinding mills are now working near Fort Portal, so the Toro wheat growers are assured of a steady demand, and production will increase.

A creditable sample was grown in Kigezi District during the year.

Unfortunately owing to transport charges, Toro flour cannot compete with imported flours in Kampala, where there is a big demand.

African Silk Worm.

This industry is of some importance to the Mubendi District, but being entirely in German hands, there has been nothing done since the outbreak of war.

Tea.

The plot of tea on the Government Plantation reserved for cropping purposes yielded at the rate of 135 lbs. of prepared tea per acre, which is disposed of locally. The plot reserved for seed purposes supplied sufficient for the small local demands, but the germination was low.

Tea promises well, but at present there appears to be little chance of its being taken up.

Fruit and Vegetables.

As in previous years, further efforts have been made to introduce exotic fruits which are likely to succeed, and thus gradually extend their cultivation throughout the country.

Planters are recommended to cultivate a few trees near their houses, as the presence of fresh fruit is a boon anywhere, but particularly so in the tropics.

Large white onion seed from India has been tried, and it is proving most satisfactory.

Insecticides and Fungicides.

In a country such as this where the dangers from insect and fungoid pests are so many and great, it is essential for a local stock of insecticides and fungicides with the necessary appliances to be available.

Up to the present this has not been the case, and in consequence many estates have suffered accordingly.

A local firm is now making an effort to import and stock sufficient for local requirements.

Live Stock.

This industry is of great importance in the Western and Eastern Provinces, and there is a considerable trade in the export of hides, skins and ghee.

Unfortunately cattle do not thrive in some places, otherwise they would be much more largely employed for the cultivation of land, and for transport.

Veterinary.

The report of the Chief Veterinary Officer is attached, from which it will be seen that Rinderpest in Buganda Province is at present quiescent.

The war has prevented any work being done in the Eastern Province, where outbreaks of Rinderpest have been reported occasionally.

Botanical.

The Acting Botanist has been fully employed on the numerous plant diseases.

Colletotrichum coffeanum, Noack., was proved to be one of the causes of "die-back" on coffee, as reported by Dawe from Uganda in 1907.

The Botanist's report is attached.

Entomological.

Insect attacks have been prevalent both on coffee and cacao. Methods of control could not be applied in some cases, and the resulting losses were thus greater than necessary.

The Variegated Bug, (*Antestia variegata*, Thunb.) made its appearance on coffee during the year, and is likely to be serious unless taken in hand.

The Entomologist's report is enclosed.

Museum.

Various economic products have been added during the year so as to increase its educational value.

The building is much too small for present-day requirements, and a new wing is much required to accommodate the new show cases and exhibits. The roof has been troublesome during stormy weather, and it would appear that a new roof of corrugated iron is essential to make the building satisfactory.

Kew and Imperial Institute.

As in the previous years, numerous consignments of plants and products have been forwarded to the above institutions.

Two members of the staff spent part of their leave in study at Kew.

Four reports by the Imperial Institute are to be found in full in the Appendices.

Kampala Swamp.

The work done on the swamp was more satisfactory owing to a better labour supply. This consisted chiefly in digging out palm stumps, which proved a very tedious operation, planting up the avenues, and making a road. At each end of the road permanent culverts were put in, and the road is being extended to the Namirembe Road.

The nurseries were also much enlarged.

During the year 75,365 lbs. of sweet potatoes were reaped by the prisoners.

Importation of Plants and Seeds.

117 consignments of plants and seeds were examined during the year.

Although widely published, the regulations governing the importation of plants and seeds do not appear to be generally known, so the following recapitulation is necessary:—

A “plant” includes growing plants, cuttings, buds, bulbs, seeds, roots, and fruits and vegetables intended for propagation.

All plants imported must be fumigated by the Government Entomologist, Kampala, subject to his discretion, and must be conveyed to, and removed from the place of fumigation by the importer. Importers should accordingly make arrangements, when necessary, with an agent for clearance through the Customs, delivery to and removal from the fumigation place.

In the case of plants arriving by post, the Post Office Authorities, Kampala, deliver the parcel to the Government Entomologist, who, after treatment, will forward it to the addressee without extra postal charge.

The only port of entry for plants is Port Bell, and the only place of entry is Kampala.

The importation of cotton seed, coffee plants and seed (other than roasted beans and ground coffee) is prohibited, without the written consent, previously obtained, of the Governor.

The importation of plants from Ceylon is prohibited, without the written consent, previously obtained, of the Governor.

No other restrictions are at present in force as regards the importation of other “plants,” and no permission is needed for their importation.

Agricultural Statistics.

Thanks are due to all those who have helped in the collection of the statistics given in detail in the Appendices. Particulars of the crops being grown in the various Districts are clearly shewn, and whilst those under native agriculture are approximate only, the European plantation returns are fairly accurate.

Conclusion.

The past year has been a very trying one for the Department. Other factors, in addition to absence of staff, have been operative, so that the strain of keeping things going has, at times, been tremendous.

All the members of the staff have worked strenuously, for which I tender them my best thanks.

S. SIMPSON,

Director of Agriculture,

Uganda Protectorate.

GOVERNMENT PLANTATION, KAMPALA.

Report for the Year 1915-1916.

Meteorological Records.

Although the rainfall for the year under review was considerably less than that for the previous year, and notwithstanding the fact that the number of days on which rain fell was also less, the only trying period experienced was during July when crops suffered somewhat severely.

The following are comparative records for the last six years :—

MONTH	1910-11		1911-12		1912-13		1913-14		1914-15		1915-16	
	No. of days.	inches	No. of days.	inches	No. of days.	inches	No. of days.	inches	No. of days.	inches	No. of days.	inches
April	18	8.75	15	5.84	27	5.73	24	10.16	18	6.60	14	5.60
May	16	7.72	18	4.85	24	4.54	20	5.06	15	3.85	18	4.56
June	7	2.49	9	3.82	20	3.00	13	2.17	16	5.14	14	4.33
July	11	3.25	3	2.0	15	2.65	11	2.61	12	5.43	6	.36
August	7	7.71	21	5.60	18	10.39	7	.83	14	5.50	10	2.77
September	15	8.28	19	2.84	13	1.96	8	3.50	18	5.12	12	4.52
October	11	3.00	14	.79	21	6.21	20	1.78	19	5.43	14	5.23
November	15	8.25	24	8.60	23	3.07	20	3.80	26	8.00	18	6.33
December	15	4.57	10	.57	21	5.13	12	2.96	6	.55	13	3.84
January	8	1.13	11	3.12	8	2.37	9	3.63	5	.69	10	.81
February	4	.77	12	2.57	15	3.96	9	1.63	12	4.90	11	4.90
March	16	6.65	26	8.39	15	7.68	20	3.81	15	4.01	15	4.40
TOTALS ..	143	60.57	182	47.19	220	56.69	173	41.93	176	56.82	155	47.65

Monthly Average Temperatures, Year 1915-1916.

MONTH	At 7 a.m.		At 2 p.m.		Maximum Temperature.	Minimum Temperature.	Highest Maximum Recorded.	Lowest Minimum Recorded.
	Dry Bulb.	Wet Bulb.	Dry Bulb.	Wet Bulb.				
April	69.2	67.7	78.3	76.1	81.36	66	85	64
May	70	68.42	78	75.42	71.09	66.22	86	62
June	68.43	67.1	76.43	73.93	80.3	64.83	83	62
July	66.74	65.42	78.13	75.3	80.8	63	84	60
August	67.10	65.67	78.33	75.67	80.29	64.09	85	60
September	67.7	65.63	76.26	72.93	79.46	63.6	84	61
October	67	64.74	75.5	71.8	77.5	63.71	82	62
November	67.36	64.73	75.7	70.23	78.5	63.83	82	62
December	67	64.45	75.4	69.89	77.35	64	80	62
January	68.1	65.13	78.4	70.8	79.74	65	84	63
February	68.86	66.1	78.1	72.34	80.65	65.17	84	62
March	68.51	66.8	74.5	71.55	80.12	65.35	84	63

Labour.

There has been little or no difficulty as regards labour during the year, and the supply has been more than ample for the last six months. It was also cheaper during that period.

Nursery.

The Nursery has been well stocked during the year, and the demand for Economic and Decorative Plants has been again satisfactory.

The following is the record of plants and seeds distributed :—

	Economic Plants.	Decorative Plants.	Cacao Seed.	Tea Seed.	Various Seeds.	Seeds in packets.
1st quarter ..	583	403	3,500	400	lbs. 221	2
2nd " ..	116	425	23,775	..	2	6
3rd " ..	57	2,681	20,256	..	5	5
4th " ..	184	192	6,750	225	159	2
TOTALS ..	940	3,701	54,281	625	387	15

Coffea Arabica.

The improvement of last year in the general condition of the coffee on the Plantation has been well maintained during the year under review, for "leaf disease" and "die-back" did not reach such a climax as during the two previous years.

The Chart shewing the fluctuations of the leaf-disease (*Hemileia vastatrix*, B. et Br.) is again included in the report (not produced) and shews the line of fluctuation from the advent of the disease up to the present.

It is remarkable that in three cases the rise commences about the month of February and culminates round about the months of July and August, or, in other words, begins with the rains and ends with the drought. It will be further observed that the degree of prevalency was not so high as in previous years, and that a long spell of partial immunity existed from August, 1915, to February, 1916 (about seven months).

Manurial Treatment and "Die-back"

"Die-back" continues to be the worst enemy of coffee, and, although less prevalent during the year than formerly, was most evident in the plot where least expected, that was Plot No. 4, the heavily manured one. The manurial treatment resulted in a high yield, but with a loss of about 50% of the primaries. Other plots, manured and unmanured, have also suffered more or less severely. Such results are paradoxical assuming that "die-back" is due to physiological causes, and are theoretically not what one would expect in view of the manurial treatment.

These results, together with the finding of almost simultaneously a fungoid disease, *Colletotrichum coffeanum*, Noack., * on the leaves and twigs, has somewhat modified the views previously held as regards "die-back" and its causes.

Yields.

However, the yields for the year are encouraging, and in most cases satisfactory. One disappointing feature, nevertheless, is the loss of the primaries in the plots which were normal the previous year. The slow recovery to normal health of the older plots does not, unfortunately, counter-balance this loss.

The following are the records of yields, etc., from the various plots under various treatment:—

Nyasaland Variety. 5½ years. 6' × 8'

No. of Plot.	Total No. of Trees.	No. of Good Trees.		No. of Indifferent Trees.		Total Yield of Parchment Coffee.		Average Yield of Parchment Coffee per Tree.		Weight of Buni.†	REMARKS.
		Previous Record.	Present Record.	Previous Record.	Present Record.	Previous Record.	Present Record.	Previous Record.	Present Record.		
						lbs.	lbs.	ozs.	ozs.	lbs.	
1	716	590	637	126	79	287½	237½	5·3	5·3	12	Manured with Basic slag (400 lbs.) and a slight dressing of Farmyard manure, 1913. Egyptian Phosphates 120 lbs. 1915.
2	1,169	653	1,147	533	22	108	168½	1·45	2·3	9	Unmanured. 551 trees in this plot stumped to 6".
3	1,386	589	1,186	786	200	133½	269	1·61	3·1	11	Unmanured.

The total numbers of trees do not include dead trees as the previous totals did, but represent the number of trees actually in the plots.

The manurial treatment of Plot No. 1 has not resulted in an increase of yield, although the trees are bearing heavily at present. It has, however, improved the general health of the plot considerably.

* See Botanical Report.

† Immature Berries.

Stumping of Plot No. 2 took place during April, 1915, and the suckers were so well established that they flowered during February, 1916—ten months later—and are equivalent to two year old trees. These are included in the good trees. The stumping in the plot no doubt accounts for the decrease in yields as compared with Plot No. 3, as they were both much on a par the previous year. It will be interesting, however, to see eventually what lead this rejuvenation gives as compared with the natural recovery of the trees in Plot No. 3

Nyasaland Variety. 4 years. 8' x 8'.

No. of Plot.	Total No. of Trees.	No. of Good Trees.		No. of Indifferent Trees.		Total Yield of Parchment Coffee.		Average Yield of Parchment Coffee per Tree.		Weight of Buni.	REMARKS.
		Previous Record.	Present Record.	Previous Record.	Present Record.	Previous Record.	Present Record.	Previous Record.	Present Record.		
4	724	737	539	Nil	185	lbs. 251½	lbs. 775	ozs. 5·44	ozs. 17·12	lbs. 209	Manured with Cotton Seed and Liquid Cow-manure.
5	305	312	203	Nil	102	100	196	5·00	10·28	49	Unmanured.

Plot No. 4 was manured in January, 1914, with decayed Cotton Seed, and 12 lbs. were given to each tree, or roughly four tons to the plot. The effect of this manurial treatment was very noticeable in comparison with the control Plot No. 5, and right through the early months of 1915 the plot was looking remarkably fine. It began to give way, however, towards the ripening stage, and during August a bucketful of liquid cow-manure was given to each tree, but this did not prevent the loss of a large number of primaries, and the considerable amount of crop in Buni.

Nyasaland Variety. 4 years. 6' x 8'.

No. of Plot.	Total No. of Trees.	No. of Good Trees.		No. of Indifferent Trees.		Total Yield of Parchment Coffee.		Average Yield of Parchment Coffee per Tree.		Weight of Buni.	REMARKS.
		Previous Record.	Present Record.	Previous Record.	Present Record.	Previous Record.	Present Record.	Previous Record.	Present Record.		
6	610	610	501	Nil	109	lbs. Nil	lbs. 546	ozs. 6·16	ozs. 14·32	lbs. 5	Manured with Basic slag, 1913.
7	544	544	463	Nil	81	Nil	584	6·16	18·1	10	Unmanured.
8	1,064	1,064	866	Nil	198	Nil	560½	6·16	8·42	20	Unmanured.
9	575	575	462	Nil	113	Nil	415	6·16	11·54	—	Mulched with Lemon grass.

The original Plot No. 6 was re-arranged for experimental purposes at the beginning of the year, and included Plot No. 7, and parts of 8 and 9. This stretch of coffee was in a normal condition last year, and the indifferent trees were practically nil. The average yields of parchment coffee from the original Plot No. 6 are put in for comparison with the average yield per tree on the plots as now constituted.

Two rows of trees in Plot No. 6, which is directly opposite Plot No. 4 where the "die-back" was prevalent, suffered severely also from this disease. It occupies the top of the slope, whereas No. 7 occupies the lower part. These facts, together with the gravelly parts of the plot, place No. 6 at a disadvantage with No. 7, and undoubtedly accounts for the lower yield, notwithstanding the manurial treatment.

Plot No. 9 was mulched during April and May, 1915; 50 lbs. were given to every four trees and amounted to roughly five tons to the plot. Seven months later this mulch was fully incorporated into the soil, and resulted in a marked difference in the general health of the trees as compared with No. 8. The cost of a bundle of this mulch is from one to two cents, depending on the distance it has to be carried. It has been used largely on the Plantation in dividing plots and bordering the roads through the Plantation. An one hundred feet stretch yields from 475 to 500 lbs. of green mulch, and 100 lbs. of green mulch is equivalent when dry to 41 lbs.

The recovery of the plots which were badly affected by "die-back" during July and August has been remarkable, and had a count of indifferent trees been made at that time the number would have been very much greater than at present.

The general health of the coffee at present is good, and bids fair—other things being equal—to give better yields next year.

Coffea Species.

Other coffees are being experimented with, but the majority of them have not yet reached the bearing stage.

The following table shews concisely what has been done in this respect:—

Experimental Coffees.

Species of Coffea.	Origin.	Age.	Date when planted.	Distance apart.	REMARKS.
		Years.			
<i>Coffea robusta</i> ..	Toro indigenous	2 $\frac{3}{4}$	March, 1914 ..	12' x 12'	This plot contains a number of trees shewing distinct characters from the type, viz., broad and narrow leaved. Flowered lightly November, 1914, full flower February, 1916.
<i>Coffea robusta</i> ..	Local ..	2 $\frac{1}{2}$	— .. September, 1914..	12' x 12' and 15' x 15'	Planted with shade trees <i>Gliricidia maculata</i> . Flowered lightly March, 1916. Affected by leaf-disease <i>Hemileia vastatrix</i> .
<i>Coffea robusta</i> ..	Bwamba Forest (Semliki)	2	May, 1915 ..	12' x 12'	Planted with shade trees <i>Caesalpinia dasyrachis</i> . A few flowers observed February, 1916.
<i>Coffea</i> sp, Quilou.	Java ..	1 $\frac{1}{2}$	March, 1916 ..	12' x 12'	No shade
<i>Coffea robusta</i> ..	Bwebza, Toro	2	March, 1916 ..	12' x 12'	No shade
<i>Coffea canephora</i>	Java ..	1 $\frac{1}{2}$	March, 1916 ..	12' x 12'	No shade
<i>Coffea arabica</i> .. 3A	Local ..	1	May, 1915 ..	8' x 8'	No shade
<i>Coffea</i> sp. (Nandi coffee).	Nandi, B.E.A.	1 $\frac{1}{2}$	November, 1915 ..	8' x 8'	Shaded with <i>Grevillea robusta</i> and Lantoro
<i>Coffea liberica</i> ..	West, Africa	1 $\frac{1}{2}$	March, 1916 ..	12' x 12'	No shade
<i>Coffea excelsa</i> Plyndel Nos. 1 and 2	Java ..	1 $\frac{1}{2}$	September, 1915..	15' x 15'	Planted with shade tree <i>Caesalpinia dasyrachis</i> .
<i>Coffea excelsa</i> Culture No. 2	Java ..	1 $\frac{1}{2}$	September, 1915..	15' x 15'	No shade The growth of the <i>excelsa</i> was slow at first, but made headway after the production of primaries.

These form a series of small plots, but of sufficient size for test purposes, and for seed distribution if necessary.

Cacao.

The Cacao crop has again made satisfactory progress, as will be seen from the increased averages for the present year. Only in one case has the average slightly fallen, but they have been steady in this instance however.

These records shew further that some trees have added considerably to their total yield during the present year whilst others are still slow in bearing, and that others have yielded well and consistently,

In one or two instances trees have been lost by "die-back," but the averages are calculated on the original number of trees.

Theobroma Cacao Forastero.

RED VARIETY.					YELLOW VARIETY.				
No. of tree.	Previous Record.		Present Record.	Total yield to date.	No. of tree.	Previous Record.		Present Record.	Total yield to date.
	1913-1914.	1914-1915.				1913-1914.	1914-1915.		
6	27	61	17	105	1	12	53	44	109
10	8	9	16	33	3	28	64	91	183
16	8	4	26	38	9	19	10	39	68
17	19	28	46	93	11	8	12	20	40
20	13	5	27	45	12	4	5	18	27
21	11	17	25	53	13	8	11	22	41
22	11	61	37	109	14	8	0	0	8
24	9	7	58	74	18	2	12	25	39
26	6	8	4	18	19	4	44	36	84
27	4	12	52	68	23	3	40	122	165
29	11	44	97	152	25	9	17	57	83
31	9	28	46	83	28	4	73	110	187
32	2	55	95	152	30	9	31	13	53
33	3	8	3	14	39	1	3	61	65
34	7	10	24	41	42	2	0	1	3
35	8	26	22	56	43	2	2	3	7
36	11	12	28	111	45	8	87	114	209
37	4	3	26	33	47	4	30	17	51
38	7	64	30	101	49	6	2	51	59
40	1	27	33	61	50	4	9	36	49
41	11	62	0	73	51	1	20	21	42
44	2	8	11	21	52	11	29	34	74
48	7	44	53	104	53	14	13	77	104
55	1	28	84	113	54	3	12	34	49
56	4	3	10	17	58	6	1	41	48
60	4	5	32	41	61	4	22	44	70
62	2	1	78	81	67	11	79	27	117
65	4	4	0	8	68	10	5	84	99
71	5	5	74	84	70	6	22	11	39
72	8	76	54	138	76	16	0	49	65
74	15	22	67	104	79	3	15	19	37
75	24	21	53	98	82	46	94	57	197
80	12	0	0	12					
81	14	21	9	44					
Total 34	292	789	1,297	2,378	32	276	817	1,378	2,471
Yearly averages *1913-14	8·6					8·62			
Yearly averages 1914-15		23·2					25·5		
Yearly averages 1915-16			38·14					43	
Total averages				69·94					77·22

* Yield for 9 months only.

Theobroma Cacao Calabacillo.

[illegible]

The greater part of the Cacao estate has been divided into a series of plots, and these have been sub-divided by a path running along the Plantation at the same level throughout, and divides the sloping part from the alluvial.

A record of the yield and weight of pods has been kept from the top and bottom parts of each plot since September of last year—six months—and is tabulated below.

The average yield per tree in many cases is low, but the Plantation has on the whole suffered from lack of proper cultivation for some considerable time, resulting in a number of weak and unbearing trees.

The best yields, however, are from plots which have been amply shaded by bananas—the Para are small yet and do not afford much shade. The trees in these plots are, generally speaking, better developed and freer in growth as compared with the stunted appearance of those less shaded.

Age of Trees, 6½ years.

No. of Plot.	No. of Trees in Plot.	No. of Pods gathered.	Weights of Pods.	Average Yield per Tree.	Nature of Shade.	REMARKS.	
			lbs.				
1 {	Top	77	165	69	2.15	Para Rubber and bananas.	Up to the present the Para and bananas have afforded little or no shade.
	Bottom	86	1,056	746	12.27	do	Shade here has been very light.
2 {	Top	76	514	272	6.76	do	Shade here is good.
	Bottom	92	1,831	1,170	20	do	Shade good.
3 {	Top	72	264	148½	3.66	do	Shade sparse.
	Bottom	87	1,452	1,037½	16.69	do	Shade good.
4 {	Top	51	63	80½	1.4	do	Shade very light.
	Bottom	140	2,581	1,572½	18.43	do	Shade good.
5 {	Top	61	155	101	2.54	do	Shade good.
	Bottom	126	2,656	1,505	21	do	Shade good.

Rubber.

GIRTH MEASUREMENTS.—The average girth of the Para trees for the present year works out at 15 inches, as compared with 12 inches for the previous year, but there are still a large number of trees below the tapping size.

The table below indicates the progress made in the growth since date of planting, but does not perhaps fully represent the total improvement in the trees during the period under review, as most of them have thickened out considerably below the three feet measurement and have also added largely to their leaf system, which should be greatly in favour of the general building up of the trees.

The increases are put down to the nearest simple fraction.

Para Rubber Girth Measurements.

PLANTED MAY, 1910. 20' x 18'

No. of Measurement.	Date of Measurement.	No. of Months in interval.	Average Girth.	Average increase.	Rainfall during Interval.	Yearly Average Increase.	REMARKS.
1st ..	March, 1912	7	3½"	..	36.66"		Inter-cropped from date of planting and during this period with <i>Coffea arabica</i> . Uprooted October, 1913.
2nd ..	Sept., 1912	11	5½"	1½"	49.25"	3½ years 2½ inches	
3rd ..	Aug., 1913	5	7¾"	2¾"	15.66"		
4th ..	Jan., 1914	7	8¾"	1½"	31.96"	4½ years 3 inches	Dug over and clean weeded for the greater part of this period.
5th ..	Aug., 1914	5	10½"	1¾"	19.79"		
6th ..	Jan., 1915	7	12"	1¾"	26.53"	5½ years 3½ inches	
7th ..	Aug., 1915	5	13¾"	1¾"	20.73"		
8th ..	Jan., 1916		15"	1¼"			

PARA RUBBER TAPPING YIELDS.—A series of tapping experiments were carried out on 160 trees at Rubaga, lent for this purpose by Stanislaus Mugwanya.

These trees—approximately eleven years old—are growing on top of Rubaga Hill in a red gravelly clayey soil.

They have had no special cultural treatment apparently, apart from the usual native system of weeding, and have been planted haphazardly and vary from six feet to fifteen feet in distance apart. Notwithstanding these disadvantages, the majority of them are fine trees—the largest being 31 inches and the smallest 19 inches in girth.

The experiment is not yet complete, but the results as they stand may be of interest.

The method of tapping adopted in series one and two is not now generally recommended, especially over half the surface of the tree, as it uses up the bark too quickly. It serves, however, to shew the bearing capacity of our trees. The difference between the yield of dry rubber in this method and the one incision method is about double, *i.e.*, 16 lbs. 6 ozs. as against 8 lbs. 14 ozs.

Alternate day tappings have proved to be the best method in one to four series, for although the yield in dry rubber has been slightly less, especially in series two as compared with series one, the area of bark still left to excise is considerable. This advantage is not so strongly borne out in the five to eight series where less bark in each series was excised, and where the every day tappings have yielded very much higher than the alternate day tappings, but in this case again the alternate day series have still a good area of bark from which to yield.

In the daily series the tappers have used up almost a foot of bark in four months=100 parings, which works out roughly at eight parings per inch. The Burgess knife was used in each series.

The 160 trees yielded 70 lbs. 12 ozs. of dry rubber during the period as tabulated below, and the cost per lb. was 54 cents.

Para Rubber Yields, Rubaga.

TREES 11 YEARS OLD.

No. of Series.	No. of trees in Series.	No. of incisions per tree.	Average girth at 3' from base.	Total No. of tap-pings.	Days on which tapped.	Total yield of dry rubber (in biscuit form).	Average yield of dry rubber per tree.	Weight of Scrap.	REMARKS.	
½ surface of tree tapped.	1	20	5	27.15"	78	every day	16 lbs. 6 ozs.	ozs. 13.1	2½ ozs.	This series varied considerably in daily yield of latex and shewed a marked falling off after the 30th tapping.
	2	20	5	29.95"	42	every 2nd day	14 lbs. 1 oz.	11.25	1½ ozs.	Yields varied very slightly and were very constant throughout the tapping.
	3	20	2	24.5"	79	every day	12 lbs. 4 ozs.	9.8	2 ozs.	Yields fairly constant throughout.
	4	20	2	24.1"	42	every 2nd day	7 lbs. 7 ozs.	5.95	2 ozs.	Yields fairly constant and increased slightly towards end of tapping.
	5	20	1	24.4"	79	every day	8 lbs. 14 ozs.	7.1	1½ ozs.	Yields fairly constant throughout.
	6	20	1	24.3"	42	every 2nd day	4 lbs. 6 ozs.	3.5	1 oz.	Yields fairly constant throughout.
¾ surface of tree tapped.	7	20	2	22.2"	55	every day	5 lbs. 1 oz.	4.05	1 oz.	Yields low at first, increased, and varied.
	8	20	2	21.65"	35	every 2nd day	2 lbs. 5 ozs.	1.85	½ oz.	Yields low at first, increased, and varied.

Tea.

The lower plot of tea which was pruned back during 1914 has been gradually worked into shape for yielding purposes, but it has not been possible to get full value from this plot as yet, as it was originally growing for seed purposes.

The yields of leaf for the year have, however, been recorded and are interesting in shewing a gradual increase in yield with the successional prunings. These records represent prepared tea, but it should be understood that the majority of the trees have in no way reached their full bearing capacity.

It is perhaps premature to predict what prospects there are for tea cultivation in this country, but the growth of the tree and the reports on the prepared product are highly encouraging.

Tea Yields.

(Dry leaf) Half acre. Planted August, 1911. Pruned back 1914. 3' x 4'.

1st Flush.	2nd Flush.	3rd Flush.	4th Flush.	5th Flush.	6th Flush.	7th Flush.	TOTAL YIELD.
2 lbs.	3 lbs.	5 lbs.	9 lbs.	13 lbs.	14 lbs.	19 lbs.	} 67 lbs. 12 ozs.
9 ozs.	2 ozs.	$\frac{1}{2}$ oz.	5 ozs.	$7\frac{3}{4}$ ozs.	$5\frac{1}{2}$ ozs.	15 ozs.	

Conclusion.

This report is again confined to the crops of general interest, and does not deal with all the crops grown on the Plantation.

A series of acre plots have been opened up, some of which are now occupied by the various *Coffea* and *Cacao* sp. The opening up of these plots will be continued, with a view to including Sugar-cane, Limes, Pineapples, and other crops of economic value in the experimental work.

T. D. MAITLAND,
District Agricultural Officer.

ANNUAL REPORT

ON

THE GOVERNMENT PLANTATION, KAKUMIRO, MUBENDI.

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Rainfall.

There was a fairly evenly distributed rainfall throughout the year, the only really dry period being from the 13th December to the 1st February, during which time only .32 of an inch of rain was recorded. The highest fall on any one day was 3.22 inches on the 8th August. The records as far as available are given in the following table:—

MONTH.	1912-13		1913-14		1914-15		1915-16	
	No. of days on which rain fell.	Amount of rain in inches.	No. of days on which rain fell.	Amount of rain in inches.	No. of days on which rain fell.	Amount of rain in inches.	No. of days on which rain fell.	Amount of rain in inches.
April ...	No record		20	7.16	16	5.18	15	7.39
May ...			11	2.12	8	2.86	11	3.48
June ...			No record		10	3.50	7	1.63
July ...			8	1.29	9	3.07	5	3.22
August			9	2.48	10	4.95	7	4.62
September			9	4.37	17	6.74	14	4.40
October	16	3.01	15	6.49	20	8.16	12	8.09
November	14	6.06	13	3.13	21	8.71	15	5.22
December	7	1.10	2	0.14	5	1.11	9	2.59
January	4	1.17	7	1.97	2	0.12	2	0.32
February	9	2.85	5	0.77	7	1.46	16	5.95
March	9	3.91	12	6.09	12	4.38	9	3.91
TOTALS	59	18.10	111	36.01	137	50.24	122	50.82

Area.

During the year under review a banana fire belt thirty feet wide has been planted on the East side of the Plantation, $1\frac{1}{2}$ acres have been planted with cotton and half an acre with "Native" coffee, bringing the area under cultivation, exclusive of roads, up to $34\frac{1}{2}$ acres.

Coffee.

NYASALAND VARIETY.—The total area under this variety of *Coffea arabica* is now 21·81 acres all of which is now bearing. The trees are planted 8'×8', the plot planted in 1910 being on the triangular system and the remainder on the square. Particulars of the yields obtained from the various plots for the past four years are given in the adjoining table:—

Year planted.	Area in acres.	Average number of trees per acre.				Average Yield of "Parchment" per acre in lbs.				Average Yield of "Parchment" per tree in lbs.			
		1912—13	1913—14	1914—15	1915—16	1912—13	1913—14	1914—15	1915—16	1912—13	1913—14	1914—15	1915—16
1904	*3·68	525	546	541	605	1052	1034	233	711	2·00	1·89	·43	1·11
1906	2·11	578	627	611	536	1099	483	130	261	1·89	·77	·21	·48
1907	1·90	487	630	603	559	761	1274	347	818	1·56	2·04	·57	1·44
1910	1·95	633	774	771	782	474	1712	638	1297	·69	2·21	·82	1·59
1911	2·99	—	635	616	595	—	107	200	283	—	·16	·32	·47
1912	1·21	—	623	644	648	—	123	880	642	—	·19	1·36	·98
1913	7·97	—	—	654	624	—	—	99	430	—	—	·15	·68

* 5·23 acres previous to 1915-1916.

As was expected most of the older trees recovered from the set-back received from the first attacks of *Hemileia vastatrix*, though they have not recovered all their former cropping qualities. The trees planted in 1912 show a decrease this year as would seem usual with young trees after their first heavy crop when attacked by *Hemileia vastatrix*.

A comparison of the yields of the older trees planted from 1904 to 1910 is given separately in the next table showing more clearly to what extent these trees have recovered:—

Year under review.	Average Number of Trees per acre.	Average Yield of "Parchment" per acre.	Average Yield of "Parchment" per tree.
1912-13	556	911 lbs.	1·63 lbs.
1913-14	615	1,089 „	1·77 „
1914-15	605	304 „	·50 „
1915-16	620	741 „	1·19 „

It will be noticed that the trees average almost half a pound of parchment less this year than in 1912-1913. *Hemileia vastatrix* and *Colletotrichum coffeanum* have been prevalent on the coffee throughout the year, while an undetermined root disease combined with a scale insect, *Pseudococcus citri*, has been prevalent on the roots of the coffee planted in 1913, a large number of these trees having been killed or severely damaged.

A portion of the area planted in 1904, the trees of which were doing badly at the time the Plantation was taken over by this Department and many of which have since died or become unproductive, has been gradually planted up with various timber trees and Para rubber and is no longer included in the coffee area.

A number of the trees planted in 1906 where *Hemileia vastatrix* was first prevalent have been gradually losing their vigour and dying, and this area has now been interplanted with Para rubber which will eventually take the place of the coffee. The reason of these two plots not doing so well is due to the ground being cropped heavily with food-crops before the coffee was planted and the coffee did not get a good start.

MANURIAL EXPERIMENT.—1·60 acres of the trees planted in 1904 were manured in February, 1915, one pound of Egyptian Phosphate being applied to each tree. This coffee was kept separate in 1915-1916 and it was found that the manured trees yielded 56 lbs. of "Parchment" per acre more than the unmanured trees.

Coffea arabica var. *Costa Rica*.—This variety has not made particularly strong growth and does not compare favourably with the Nyasaland variety. The trees have suffered rather severely from attacks of *Hemileia vastatrix*.

Coffea stenophylla.—The trees of this species have made very poor growth and many of them have died.

NATIVE COFFEE (*Coffea robusta* var.).—Half an acre of this coffee was planted out in March and the trees are doing well.

SHADE TREES.—*Erythrina velutina* and *E. umbrosa* have now been planted in all the young coffee plots and many of the old plots to provide shade. *E. umbrosa* has proved the most successful, growing much quicker than *E. velutina*, and many of these trees will soon be giving a shade which should prove beneficial to the coffee.

Rubber.

There are three kinds of rubber trees under cultivation, namely, Para, Funtumia, and Ceara. Of these the two former were planted in 1906 before the Plantation was taken over by this Department and suffered from neglect in their early stages of growth, the troublesome weed "*Digitaria mutica*") being even now not entirely eradicated.

Particulars of the measurements of the trees for the past three years are shown in the accompanying table:—

Particulars of Measurements.	Para planted 1906 20' x 20'.			Funtumia planted 1906 8' x 8'.			Ceara planted 1912 15' x 15'.		
	1913-14	1914-15	1915-16	1913-14	1914-15	1915-16	1913-14	1914-15	1915-16
Number of trees ...	367	367	367	77	77	77	350	343	335
Average girth at 3 feet ...	17·10"	19·47"	23·24"	17"	18"	20"	12"	15·32"	18·74"
Maximum girth at 3 feet ...	26"	28"	33"	24"	26"	28"	21"	24"	30"
Minimum girth at 3 feet ...	11	12"	15"	9"	10"	11"	9"	10"	11"
Average increase in girth ...	1·77"	2·37	3·77"	...	1"	2"	...	3·32"	3·42"

It will be noticed that the yearly increase in the girth of the Para has increased owing to better cultivation.

PARA RUBBER.—165 trees were tapped during the year, these being divided up into four groups and nineteen single trees. The results obtained from the latter, which were tapped on various systems, were found to be of very little value owing to the variation in yield of individual trees, and accordingly these are not given here, but particulars of the yields of the groups are given in the following tables, the first showing the monthly yields and the second the totals, methods of tapping, etc.:—

MONTH OF TAPPING.			RAINFALL.				GROUPS A and B.					GROUPS C and D.					GROUP E.					GROUP F.				
			Days.	Inches.	Number of times tapped.	No. of trees not yielding	Dry rubber in ozs.			No. of trees not yielding	Dry rubber in ozs.			No. of Trees not yielding	Dry rubber in ozs.			No. of Trees not yielding	Dry rubber in ozs.			No. of Trees not yielding	Dry rubber in ozs.			Average per tree
							Biscuit	Scrap	Total		Biscuit	Scrap	Total		Biscuit	Scrap	Total		Biscuit	Scrap	Total		Biscuit	Scrap	Total	
April ...	...	15	7.39	13	Nil	Nil	51½	4¾	55¾	Nil	31½	1¾	33	Nil	36	3½	39½	Nil	24½	2½	26¾	Nil	24½	2½	26¾	Average per tree
May ..	...	11	3.48	13	"	"	119¾	8¾	128¾	"	55	1¾	56¾	"	67½	3½	70¾	"	68¾	3½	66¾	"	68¾	3½	66¾	Average per tree
June ...	...	7	1.63	13	7	7	86½	6	92½	1	56½	3	59½	1	73½	4	77½	"	82	2	84	"	82	2	84	Average per tree
July ...	...	5	3.22	13	7	7	114½	8½	123	1	53½	2	55½	1	54½	5	59½	"	90½	3	93½	"	90½	3	93½	Average per tree
August ...	...	7	4.62	13	7	7	70	7½	77½	1	33	1	34	1	48½	7	55½	"	40½	2½	43	"	40½	2½	43	Average per tree
September ...	...	14	4.40	13	9	9	50½	6	56½	3	22	1	23	3	21	2½	23½	3	18	2½	20½	3	18	2½	20½	Average per tree
October ...	...	12	8.09	4	9	9	14½	2	16½	3	8½	1½	9½	3	8¾	1¾	10¾	3	10¾	7	11½	3	10¾	7	11½	Average per tree
TOTALS ...	...	71	32.33	82	9	9	506¾	43	549¾	3	259½	11¾	271½	3	309¾	26¾	336½	Nil	329½	16½	345¾	3	329½	16½	345¾	8.63

Group.	No. of Trees.	Average girth at 3 feet in inches.		Method of tapping	Number of times tapped.		Average dry rubber per tree in ozs.		Average dry rubber per tree per tapping in ozs.	
		1914—15	1915—16		1914—15	1915—16	1914—15	1915—16		
A & B ...	46	21.82	24.19	Half herring bone ...	89	82	11.04	11.95	.124	.145
C & D ...	24	20.70	23.08	One and two V cuts ...	80	82	9.68	11.30	.121	.137
E ...	46	—	21.00	Half herring bone ...	—	82	—	7.30	—	.089
F ...	40	—	20.16	Two V cuts 1 foot apart	—	82	—	8.63	—	.105

All the trees were tapped on alternate days from the beginning of April to the second week in October. The trees in Groups A and B had three cuts one foot apart, while the trees in Group E only had two cuts, being smaller trees.

It was originally intended to keep Groups C and D separate, but owing to a mistake by the native headman they had to be combined. Ten of these trees only had one V cut at the base.

One-third of the circumference of the trees was tapped in each case.

For the first four months the trees yielded very well, Groups C, D and E attaining their maximum yield in the third month, and the other two groups in the fourth.

The percentage of scrap rubber was much higher in the groups tapped on the half-herring bone system. Had the trees been rested for a month or two after the first four months' tapping, the yields would probably have been higher.

CEARA RUBBER.—65 trees along the path running West were tapped 53 times on the spiral system and yielded 17 lbs. $9\frac{1}{2}$ ozs. of dry rubber, or 4.33 ozs. per tree. These trees have now been cut down to make way for an avenue of *Grevillea robusta*. 123 trees in Plot No. 16 having an average girth of 20 inches at 3 feet were tapped 26 times on one-third of their circumference on the half-herring bone system and yielded 12 lbs. 4 ozs. of dry rubber, or 1.51 ozs. per tree.

The rubber obtained during 1914-1915 was sold in London in November at two shillings per lb., the price of standard crepe at the time being two shillings and six pence per lb.

Cacao.

The Cacao trees planted in March, 1914, have made very poor growth and quite a number of them have died. The best trees are only about two feet high and unbranched, but many are only one foot high. A sufficient number of seedlings has been raised in the nurseries to fill up all vacancies.

Tea.

A small plot .12 acre has been planted during the year. A fair amount of these died at the time of planting, but the remainder are making excellent growth, and it is hoped to fill up all vacancies and extend the area at an early date.

Native Silkworm Trees.

(*Bridelia micrantha* var. *ferruginea*.)

These trees have made very vigorous growth and the majority of them are about ten feet high and well branched, though a few which started badly are smaller. The plot has not yet been stocked with silkworms, but three nests of cocoons have already become established by natural means, and steps will be taken to see that the plot is properly stocked during the coming year.

Cotton.

One-third of an acre was planted with "Nyasaland" and one acre with "Uganda Allens" in July, 1915. The former obtained the best stand and made the most vigorous growth in the early stages, there being many blanks in the "Uganda Allens" which although re-sown were not entirely filled up. Afterwards both plots made good growth though the "Nyasaland" retained its lead. The plants gave a good yield up to the commencement of the spring rains when *Colletotrichum gossypii* was noticed to be prevalent both on the bolls and stems, and many of the bolls did not open properly. The cotton was of excellent colour and the staple was strong and of from one inch

to one and a quarter inches in length. The yields up to the end of March were as follows :—

Variety.	Area.	A Quality.	B Quality.	TOTAL.
	ACRES.	lbs.	lbs.	lbs.
Nyasaland ...	$\frac{1}{3}$	255	32	287
Uganda Allens ...	1	254	31	285

It will be noted that the "Nyasaland" yielded one lb. more of both A and B qualities than the "Uganda Allens," although the area was only one-third of that variety. This difference is largely due to the poor stand of the "Uganda Allens" as previously referred to.

Fruit.

There is about half an acre devoted to fruit trees, which include Lemons, Oranges, Pawpaws, Mulberries, Vines and a few others. All of these are doing well, but only the Pawpaws, Mulberries and some of the old Lemon trees have commenced to bear fruit.

Useful Trees.

With the exception of the rain tree, *Pithecolobium Saman*, there has been no addition to the species of trees grown, but the number of trees has been largely increased. Practically all of those planted out are making good growth and a few of the *Eucalypti* will soon be producing seed.

Miscellaneous Crops.

MAIZE.—No maize was grown as a separate crop but a small amount was sown in the banana fire belt. 10 lbs. of "Hickory King" sown in April and 5 lbs. in June yielded 441 cobs and 388 lbs. of corn. 15 lbs. of "Yellow Hogan" sown in April and 5 lbs. in June yielded 333 cobs and 538 lbs. of corn. The cobs were sold in the "green" state for food and the dried corn was sold or distributed for seed purposes.

SIM-SIM.—15 lbs. sown in April and 3 lbs. in June in the banana fire belt yielded 76 lbs.

RICE.—1 $\frac{1}{2}$ lbs. of "Dryland" rice was sown in October, a little on upland and the remainder near a swamp. The latter made the best growth though the former did well, but neither of the plots had ripened at the end of March.

Nurseries.

A large number of shade and other trees has been raised during the year for planting either among the coffee as shade trees, or along the roads. A large number of Para and a smaller number of Cacao seedlings have also been raised. Three consignments of tea seed from Kampala were sown but the seed germinated poorly.

Miscellaneous.

During the year under review the Plantation was largely in the hands of the native headman as I was away on leave from the beginning of April until October, during which time the Plantation was twice visited by Officers of the Department. On the 12th November I had to leave the Plantation for work in the Eastern Province and remained there until the end of the year under review.

J. D. SNOWDEN,

Assistant District Agricultural Officer.

APPENDIX.

Expenditure and Revenue.

EXPENDITURE.			GROSS RECEIPTS FROM PLANTATION.		
KAKUMIRO LABOUR.			CROP RECEIVED AND ESTIMATED VALUE.		
	Rs.	cts.		Rs.	cts.
April ...	136	40	12,201 lbs. coffee @ £30 per ton 1915-16 crop ...	2,451	07
May ...	150	58	774 cobs maize @ 3 cobs per cent ...	2	58*
June ...	144	92	570 lbs. maize @ 3 cents per lb. ...	17	10
July ...	167	94	48 bunches bananas ...	2	24*
August ...	122	08	519 lbs. cotton A quality @ Rs. 7/- per 100 lbs. ...	36	33*
September	146	50	64 lbs. cotton B quality @ Rs. 4/- per 100 lbs. ...	2	56*
October ...	147	23	76 lbs. sim-sim @ 6 cents per lb. ...	4	56
November ...	123	86	105 lbs. Para and 29 lbs. Ceara rubber @ Rs. 1/50 per lb. ...	211	00
December ...	130	81			
January ...	134	02			
February ...	99	38			
March ...	105	60			
TOTAL ...	1,609	32	TOTAL ...	2,727	44

* Actual price since sold.

REVENUE.		
	Rs.	cts.
To sale of 100 lbs. Ceara and 33½ lbs. Para rubber 1915-16 crop remainder previous year's crop at Rs. 1/50 per lb. ...	150	00
To sale of 560 lbs. coffee at £23-10-0 per ton and 114 lbs. 1915-16 crop remainder 1914-15 crop ...	121	83
To sale of 104 lbs. cotton B quality 1914-15 crop ...	1	00
TOTAL ...	272	83

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ON THE

GOVERNMENT PLANTATION, KADUNGURU, BUGONDO.

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Weather.

The following table shews the rainfall month by month for the year ending 31st March, 1916, also comparison with that of previous years:—

MONTH.	1912-13		1913-14		1914-15		1915-16	
	No. of days on which rain fell.	Amount of rain in inches.	No. of days on which rain fell.	Amount of rain in inches.	No. of days on which rain fell.	Amount of rain in inches.	No. of days on which rain fell.	Amount of rain in inches.
April ...	6 (from 18th)	3·75	16	9·06	11	3·77	19	8·77
May ...	14	7·12	23	10·24	14	7·50	18	7·52
June ...	11	4·55	18	7·66	15	5·48	10	2·82
July ...	11	4·00	6	4·49	13	4·73	5	2·09
August ...	11	7·85	8	2·52	16	5·18	8	3·55
September	11	3·26	4	0·91	14	7·95	18	5·49
October	10	3·17	14	6·11	20	5·85	14	4·43
November	9	3·31	12	3·99	21	11·70	14	9·36
December	2	0·58	4	1·88	3	0·36	12	3·51
January	<i>Nil</i>	<i>Nil</i>	4	2·20	<i>Nil</i>	<i>Nil</i>	4	0·83
February	7	3·95	5	1·37	<i>Nil</i>	<i>Nil</i>	11	2·25
March ...	9	4·17	10	3·53	9	6·02	10	3·31
TOTALS ..	99	45·71	124	51·96	136	58·54	143	53·83

The rainfall was well distributed throughout the year with the exception of the months of June and July when there was a short drought throughout the Province which hindered cotton sowing operations. There were practically no violent storms, comparatively few hail-storms, and there were no low night temperatures, 61·7° being the lowest recorded temperature.

The season was therefore an ideal one for cotton growing, and good yields have been obtained in the Teso and Lango Districts in spite of the fact that the bulk of the cotton crop was sown very late.

Crop Areas.

CROPS.					ACRES.
Cotton, Sunflower variety	...	...	...	...	35½
" Allen	...	...	...	...	8
" Nyasaland "	...	...	...	...	¾
					44
Maize ...	...	...	...	...	4
Buckwheat	...	...	...	...	1
Sim-sim	...	...	...	...	3
Groundnuts	...	...	...	...	3
Mwimbe (Millet)	...	...	...	...	9
Gram (Indian)	...	...	...	...	3
Rose Cocus Beans	...	...	...	...	½
Kapendi (Dhall)	...	...	...	...	5½
Tobacco...	...	...	...	...	1
Sweet Potatoes	...	...	...	...	4
TOTAL					78

Cotton Seed Selection and Propagation.

The work of cotton seed selection was continued with the two varieties Sunflower and Allen, and a small quantity of Nyasaland seed was sown for experimental purposes. The crop was a most successful one, and good yields were obtained from most of the plots.

The plots of the Allen variety gave the highest yields which bears out the results of previous years. The quality was also better than the Sunflower, thereby shewing that the season had been a suitable one for the Allen type of cotton.

In the general distribution, Serere County was sown with seed of the Sunflower variety produced from the first individual selections made on the Plantation, whilst the seed from some of the Allen selections was sown on the Namasale Peninsula.

An examination of these two varieties as they passed through the gins at Bugondo shewed a distinct superiority on the part of the Allen. The latter appeared to be more regular in staple and had a much better lustre than the Sunflower, while the strength and ginning percentage was about the same in both varieties, *viz.*, 29·5%.

The attached table summarises the results obtained from the different plots on the Plantation.

There have been some complaints by ginneries about the low ginning out-turn from last year's cotton. In this connection it is interesting to compare the lint percentages obtained from the foregoing selections during the past three years:—

Number of Plot.		Year 1913-1914.	Year 1914-1915.	Year 1915-1916.
SUNFLOWER—				
14	...	27·0	30·5	28·5
15	...	27·0	30·0	28·5
5	...	33·7	32·5	28·5
18	...	31·2	31·5	31·5
7	...	29·0	31·0	28·7
20	...	27·0	30·4	29·5
ALLEN—				
25	...	27·6	31·0	29·6
4	...	27·9	29·0	28·5

These selections were grown on the same class of soil each year and under the same system of cultivation. The variation from year to year must be due to environmental changes of weather conditions during the growing period of the crop accompanied by insect attacks such as the Stainers, *Dysdercus* and *Oxycaenus*, and the Plant Bug, *Leptoglossus*.

These insect pests attack the unripe boll sucking the sap from the mass of developing lint and seed, with the result that the boll splits prematurely, and the fibre does not ripen.

Plot No. 18 is the only one which does not seem to have varied from year to year. We may therefore conclude that this selection is not perceptibly influenced by climatic changes, and that it is therefore a suitable cotton for propagation and general distribution.

Plot No. 14 will also be propagated further. This plot was sown first and therefore suffered more than the others from the autumn storms. There was in consequence a rather high percentage of dirty and immature fibre which reduced the ginning out-turn. Given better conditions of soil and climate, this selection may yet prove to be the best one.

Plot No. 20 will be propagated in the restricted area of Kadunguru and Kagwara.

The plot of Nyasaland cotton gave a satisfactory yield considering the late date on which it was sown. The lint was disappointing being somewhat coarse, lustreless, and short stapled, although very strong. Next season I hope to be able to cross this cotton with some of the Sunflower selections and endeavour to fix a hybrid with the desirable features of both varieties.

Individual Selections.

In all 60 individual selections were made from the above plots. I was unfortunately prevented by illness from making these selections myself and the work had to be left to a native overseer.

An examination of the different samples was made in the Office and it is noteworthy to remark that, although the plants were selected without any regard to the quality of the lint, only two of them were found to be less than $1\frac{1}{4}$ " in length, and these two were from the Nyasaland variety.

Out of the 60 selections, 32 were retained for propagation, and a report on some of these is given in Table No. 2 at the end of this report. In these selections the characters mainly sought after have been strength, regularity of staple, ginning percentage and yielding capacity.

Very long and weak staples have been discarded, and medium length and strong staples have been retained.

General Remarks.

The work of cotton seed selection has now reached the end of the fourth season, and a general review of the results may not be out of place.

During these years two main varieties of cotton only—Sunflower and Allen—have been experimented with. Both of these are American Upland long staple varieties, and they have been found to be quite suitable for the country.

An attempt has been made to improve the above varieties by producing a more uniform staple of good length, strength and fineness. A staple of $1\frac{1}{2}$ " in length was obtained without much difficulty. It has been found, unfortunately, that too long a staple is not the best for the country, because it has been demonstrated that the longer the staple the more liable it is to develop weak fibres, due to the effects of environment, and more liable to attacks of insects, causing an increasing amount of immature fibre in the sample and thereby lowering the ginning out-turn. This tendency will be corrected as time goes on by selecting from staples of greater strength and immunity to insect attacks.

Manurial Experiments.

An experiment with artificial manures and cotton seed refuse was carried out on the cotton crop on land which had been under cotton for two years.

The results are not very conclusive, but the experiment should be carried on for a series of years in order to obtain definite results.

The results are contained in the following table.

The plots were each $\frac{1}{4}$ acre in size :—

Number of Plot.	Kind of Manure.				Weight of Manure.	Weight of Cotton per acre.
					lbs.	lbs.
1	No Manure	...	...	...	—	600
2	Basic slag	...	...	...	200	734
3	Egyptian Phosphate	...	...	...	56	784
4	Basic slag	...	...	...	224	820
	Cotton seed hulls	...	...	...	150	
5	Egyptian Phosphate	...	...	...	56	864
	Cotton seed hulls	...	...	...	150	
6	Cotton seed hulls	...	...	...	200	664
7	Cotton seed cake	...	...	...	200	728
8	Cotton seed cake	...	...	...	150	780
	Basic slag	...	...	...	112	

During the growing period of the crop there was no appreciable difference between the plots and no apparent difference in the quality of the lint.

Other Crops.

Small areas of Maize, Buckwheat, Sim-sim, Groundnuts, Gram, Beans, Tobacco, Millet and Sweet Potatoes were grown. These crops have been grown for several years on the Plantation for distribution to different parts of the country. They have been reported on in previous reports, and there is nothing of interest to warrant special mention in this report.

R. G. HARPER,

District Agricultural Officer.

Table No. 2.

Report on the Examination of Individual Cotton Plant Selections.

Variety of Cotton.	Number of Plant.	Number of Bolls per plant.	Weight of Cotton per plant.	Average length of Staple	Percentage of Lint.	Regularity.	Strength.	Silkeness.	Total points per contum.	Remarks.
Sunflower	1 (14)	52	lb. 0.56	inch. $1\frac{1}{8}$	29.3	Regular	F. Strong	V. Silky	63	Slight stainer attack.
do	2 do	46	0.57	$1\frac{5}{16}$	28.9	F. Regular	Strong	do	60	do
do	4 do	43	0.44	$1\frac{3}{8}$	29.8	do	F. Strong	do	60	do
do	7 do	54	0.56	$1\frac{7}{16}$	30.2	Regular	Strong	do	70	Bad stainer attack.
do	8 do	45	0.45	$1\frac{3}{8}$	30.5	do	F. Strong	do	65	Slight stainer attack
do	9 (20)	37	0.30	$1\frac{1}{4}$	29.7	do	V. Strong	F. Silky	60	
do	10 do	35	0.29	$1\frac{1}{4}$	30.5	do	do	Silky	60	
do	12 do	44	0.39	$1\frac{1}{4}$	30.8	V. Regular	do	do	77	An excellent sample of cotton.
do	14 (18)	59	0.58	$1\frac{5}{16}$	31.2	Regular	do	do	72	do
do	15 do	45	0.41	$1\frac{5}{16}$	30.4	F. Regular	Strong	do	55	
do	16 do	38	0.28	$1\frac{3}{8}$	30.9	V. Regular	V. Strong	do	72	
do	20 (7)	41	0.34	$1\frac{5}{16}$	29.6	F. Regular	Strong	do	60	Slight stainer attack.
do	22 do	40	0.30	$1\frac{3}{8}$	29.8	do	V. Strong	V. Silky	75	do
do	23 do	47	0.40	$1\frac{3}{8}$	31.5	Regular	do	Silky	79	An excellent sample of cotton.
do	24 (5)	46	0.39	$1\frac{7}{16}$	30.7	F. Regular	do	do	72	
do	25 do	43	0.35	$1\frac{7}{16}$	30.9	Regular	do	do	77	
Allen	26 (4)	50	0.56	$1\frac{1}{4}$	30.5	F. Regular	V. Strong	V. Silky	72	Seed naked—easily ginned.
do	27 (25)	48	0.45	$1\frac{1}{4}$	30.2	Regular	do	Silky	70	Staple variable but good strength and lustre.
do	28 do	47	0.45	$1\frac{3}{8}$	30.0	do	Strong	V. Silky	75	
do	29 do	60	0.58	$1\frac{1}{4}$	30.8	do	do	do	67	
Nyasaland	30 ..	65	0.75	$1\frac{3}{16}$	31.0	V. Regular	V. Strong	F. Silky	62	Staple short but very strong. Very productive.
do	31 ..	41	0.48	$1\frac{1}{4}$	30.8	do	do	do	72	An excellent sample of cotton.
do	32 ..	43	0.40	$1\frac{3}{16}$	31.4	Regular	do	Silky	62	Rather short but very strong.

NOTE:—The numbers in brackets refer to the Plots from which the selections were made.

ANNUAL REPORT

ON THE

EXPERIMENTAL STATION, FORT PORTAL, TORO.

—:O:—

This is situated about five miles from Fort Portal on the main Fort Portal-Kampala Road at an altitude of from 5,000 to 5,500 feet, and is also under the Officer-in-charge of Kakumiro Plantation, though the work of supervision is almost entirely in the hands of the District Commissioner, Toro. Work was commenced here in October, 1914.

Area.

There are only about five acres under cultivation.

Coffee.

About three acres are planted with *Coffea arabica*, Nyasaland variety, and these trees are making excellent growth. There are also a lot of seedlings in the nursery which will be planted out shortly, bringing the area under coffee up to five acres.

Para Rubber.

One hundred plants were interplanted with one acre of coffee, but these have not done well and the majority of them have died. This was not unexpected owing to the altitude.

Tea.

About one-third of an acre has been planted with Tea, but these have made rather indifferent growth up to the present, but no doubt will improve when once the trees get established. A number of the trees have died, some of them have been killed by *Colletotrichum camelliae*, but it is not known whether this is the cause of all the deaths. When more plants are available the vacancies will be filled up and the area extended.

Wheat.

Half an acre was sown in May and another half acre in June, the former being the best, though neither of them proved very successful owing to "rust." It is hoped to pay more attention to this important crop when circumstances permit.

Rice.

A few experiments were carried out with both dry and wet land rice, but so far have not met with much success; probably the failure of both this and the wheat is largely due to the difficulty in supervising the experiments as both are known to do well in the Toro District.

Other Crops.

One-third of an acre of Japanese Buckwheat sown on May 6th was reaped on the 9th July and yielded 213 lbs.

Soya beans and sim-sim have been sown between the coffee and Para rubber as cover crops and both have done well, particularly the former.

Native beans have also been grown but chiefly following after or preceding the wheat.

Miscellaneous.

Owing to the War several members of the Staff are away on military duty and it has not been possible to pay as much attention to the work in Toro as otherwise would have been done had conditions been normal.

J. D. SNOWDEN,

Assistant District Agricultural Officer.

ANNUAL REPORT

OF

THE CHIEF VETERINARY OFFICER.

—:O:—

Mr. Poulton was serving as Veterinary Officer to the Southern Frontier Force, Mr. Hart in the East African Veterinary Corps and Veterinary Assistant Fakhar-ud-Din under Captain Poulton throughout the year.

Mr. Poestkoke's agreement terminated on the 27th of January, 1916.

Mr. Strauss was lent for Military Service on the 17th of February, 1916.

Veterinary Assistant Rahmatullah was on leave from the 15th of September until the 7th of March, 1916.

Diseases of Cattle.

Rinderpest.

BUGANDA PROVINCE.

MENGO DISTRICT.—During the early months of 1915 rinderpest was confined to the extreme eastern side of the district near the Nile, but early in May the disease appeared in the Bukoba division of Kiagwe, an area heavily stocked with cattle, the infection having spread from the neighbouring infected areas in Bugerere.

Inoculations were carried out at Namuganga in Bukoba from May 20th to July 26th, 5,007 cattle being inoculated.

The deaths amongst non-inoculated cattle in Bukoba are estimated at 1,800, being about 80 per cent of the non-inoculated stock.

In July rinderpest extended into the neighbouring county of Bulemezi and spread rapidly northwards along the Sezibwa river into Buruli.

Inoculation camps were formed at Kibengo and Lubebe and inoculations were carried out there until the end of October.

The disease spread rapidly in Bulemezi during July, August and September as the local chiefs at first made little or no effort to enforce the quarantine regulations or to report outbreaks.

In October outbreaks occurred simultaneously in Kampala, Entebbe, Bombo, Mukono, Namulyango, Gayaza and Busowa. It was not possible to ascertain the origin of the infection, but it appears probable that all these outbreaks were caused by the illicit movement of cattle from the infected areas in Southern Bulemezi. These outbreaks were brought under control by January, but may be expected to recur during the rains in May and June.

In November an inoculation camp was opened at Kisubi near Entebbe at which cattle from Kampala and Entebbe were immunised.

Owing to the prevalence of trypanosomiasis amongst the cattle in Kampala and Entebbe I did not consider it advisable to have the double inoculation carried out until virulent blood could be obtained from cattle free from suspicion of trypanosomiasis.

Meanwhile cattle in both stations were inoculated with a protective dose of serum only. In some instances this gave unsatisfactory results as several herds were inoculated while in the incubative period. This was unavoidable under the circumstances as herds are frequently grazed together during the day and watered at the same place.

The outbreak at Busowa was caused by the illegal movement of a trader's cattle. These cattle were slaughtered and the carcasses buried before any other herds had become infected; up to the present no further cases have occurred in that area. The trader, a Somali, was prosecuted and a conviction obtained.

Many of the herds from Buruli sent for inoculation to the camp at Lubebe were found to be heavily infected with trypanosomiasis.

In Buruli the buffalo and bush-pig are reported to have died in some numbers and it is probable that the epidemic will spread before long from Buruli to Singo, which is very thinly populated and where game susceptible to rinderpest is numerous. Up to the time of writing rinderpest does not exist to the West of the Mayanja river but all the district East of that line must now be considered an infected area.

The following shews the total number of cattle inoculated during the year:—

DISTRICT.		Adult Cattle inoculated.	Deaths in Adults.	Calves inoculated.	Deaths in Calves.
Gulama, Kiagwe	...	179	9	64	4
Bukoba	...	3,950	712	1,057	417
Kibengo	...	6,609	628	1,740	477
Lubebe	...	1,737	516	356	171
Kisubi	...	1,109	85	148	31
Busibika	...	249	9	73	6
TOTAL		13,833	1,959	3,438	1,106
Bugerere	...	321	Not known	61	Not known
Kampala	...	331	Serum alone	74	Serum alone
Entebbe	...	448	„ „	120	„ „

Two hundred and four adult cattle and 19 calves were immunised free of charge for various Government Departments and for the Namirembe Military Base Hospital.

The fee for inoculation was raised from Re. 1/- to Rs. 2/- per head from the 1st January.

EASTERN PROVINCE.

No Veterinary Officer or Stock Inspector was available for work in the Eastern Province. Rinderpest has been prevalent there since it was introduced from British East Africa in 1910. Outbreaks were reported in many parts of the Province but losses appear to have been mainly confined to the young stock.

WESTERN PROVINCE.

The Western Province still remains free from rinderpest, but as it is prevalent in the Buganda Province on one side and in German East Africa on the other, it is only a question of time before it is introduced.

Trypanosomiasis.

It was found that many of the Buruli herds from near Lake Kioga were heavily infected with trypanosomiasis. This disease caused heavy losses amongst the transport cattle working in Busoga on the Mbale road. In Southern Ankole *Glossina morsitans* continues to spread in an easterly direction and has recently been reported close to the border of the Masaka district.

Foot and Mouth Disease.

Foot and mouth disease has been prevalent in Ankole during the past two years. In the great majority of cases the disease occurs in a very mild form.

Diseases of Equines.

Lymphangitis was as usual the most common disease amongst mules.

Exportation of Cattle.

Seven hundred and seventy nine trade cattle actively immune to rinderpest were exported to British East Africa from the Buganda Province during the year.

Importation of Animals.

A certain number of mules and ponies were imported during the year in connection with military movements.

The removal of the restrictions on the importation of dogs was largely taken advantage of.

Kampala Slaughter House Returns.

FROM 1ST APRIL, 1915, TO 31ST MARCH, 1916.

MONTHS.			ANIMALS EXAMINED.			CONDEMNATIONS.	
			Cattle.	Sheep.	Goats.	Carcases.	Parts.
April	...	...	56	52	178	1	43
May	...	...	58	30	132	3	35
June	...	...	57	23	127	3	29
July	...	...	57	17	212	1	30
August	...	...	60	20	227	2	40
September	...	...	49	39	233	...	27
October	...	...	63	44	183	1	14
November	...	...	71	19	104	1	28
December	...	...	13	48	229	3	10
January	...	...	70	35	201	3	10
February	...	...	86	44	156	6	24
March	...	...	89	40	178	6	23
TOTAL			729	411	2,160	30	313

Summary of Slides Examined.

CATTLE.			Dogs.		
Trypanosomes	...	55	Trypanosomes	...	6
Bacteria	...	2	Piroplasma	...	43
Blue Bodies	...	6	Filaria	...	3
Negative	...	1,310	Negative	...	169

SHEEP AND GOATS.			MISCELLANEOUS.		
Trypanosomes	...	30	Donkeys, negative	...	6
Bacteria	...	2	Cobus,	...	1
Negative	...	198	Fowls,	...	2

Cases Treated at the Veterinary Dispensary.

Cattle	...	695	Sheep and Goats	...	34
Mules	...	10	Dogs	...	202
Pony	...	1	Cat	...	1
Donkeys	...	2	Monkeys	...	3
Duck	...	1	Chicken	...	1

Conclusion.

The work of the past year has been almost entirely confined to the inoculation of cattle in the Mengo District and in bringing a wide-spread outbreak of rinderpest in that district under control. In view of the many difficulties which have been experienced in carrying out inoculations in the outlying parts of this district, and to the wide-spread prevalence of trypanosomiasis amongst the herds in Buruli and Northern Singo, it is not intended to attempt further inoculations on a large scale in the Buganda Province at any centre which is not within reach of Kampala.

The Division has been very short-handed during the past year, and Mr. Richardson, the Veterinary Officer in charge of the field inoculations, and the Stock Inspectors under him have carried on their work very satisfactorily under exceptionally trying conditions.

E. HUTCHINS,
Chief Veterinary Officer.

ANNUAL REPORT

OF

THE GOVERNMENT BOTANIST.

—:0:—

This report is based entirely on the work done by Mr. T. D. Maitland, District Agricultural Officer, who acted as Botanist in addition to his other duties from July, 1915, to the end of the year.

The report presented by him has been condensed, and to this has been added a few notes by Mr. W. Small, Government Botanist, on his return from leave.

Besides work done on the plant diseases recorded in previous reports, several diseases, new to Uganda, have been investigated.

Coffee.

LEAF DISEASE, (*Hemileia vastatrix*, B. et Br.).—This disease was not so virulent, and was absent for a greater period than in the two previous years, with the result that its effects were less serious than in the past. Climatic conditions have been more favourable, whilst the cultivation and pruning of coffee have become more systematic.

LEAF SPOT AND BERRY BLOTCH, (*Cercospora coffeicola*, B. et C.).—This disease was first observed on *Coffea stenophylla* plants in the nursery on the Kampala Plantation, and later its presence was found to be general throughout the country. The damage to nursery plants was sometimes severe, when most of the leaves fell off, and a proportion of the plants died. Amongst older coffee the harm is chiefly done on the berries where large sunken patches or "blotches" are produced on the upper side of the exposed surface. These centres of infection become hardened, adhere to the beans, and thus the beans pass through the pulper with parts of the pulp still attached. In some cases the bean nearest the affected part is destroyed.

On *C. robusta* it has been observed on the berries only. The damage to the crop has been small.

BROWN BLOTCH OF LEAF, (*Colletotrichum coffeanum*, Noack).—This disease was reported by Dawe as Coffee Leaf Disease in 1907 and was then said to do considerable damage. Badly attacked trees he described as very soon losing all their leaves, with a gradual withering and drying up of the branches. The disease has a wide distribution throughout the coffee plantations of the country, and during the year has been recognised as doing much harm. The attack on the leaves causes a large brown blotch very often covering half the leaf towards the apex. Mr. Maitland states that most damage is caused by the disease attacking the branches, and that diseased twigs have been received from most parts of the country. Infection usually takes place at the point of a twig which then dies backwards, but often in the middle of a twig and spreads in both directions. Young seedlings in the nursery have sometimes suffered, and the indigenous *C. robusta* is not immune.

DIE BACK.—This is very common on Uganda coffee plantations, and the losses entailed are serious. Coffee is an evergreen, so that any disease like *Hemileia* or *Colletotrichum* which causes the leaves to fall, immediately sets up conditions favourable to the death of the primaries and other branches, whilst attacks of leaf-eating insects act in a similar manner, but not to the same extent.

Unsuitability of soil, absence of drainage, trying climatic conditions, careless planting out, want of cultivation, and abundance of weeds, are some of the many factors which operate to produce the condition known as "die-back" in Uganda.

Manuring, mulching, good cultivation, intelligent pruning to restore the lost symmetry of the tree are recommended.

COFFEE SPRAYING.—Two new proprietary sprays were tried, *viz.*, a "Bouillie" mixture and a "Mildew" mixture. The former was highly recommended. The ordinary "Bordeaux" mixture was also tried for comparison. It was mixed mechanically with oil, which after being sprayed, left a thin oily film on the leaves. Spraying of the plots took place in October and again during December. Meanwhile nearly twelve inches of rain fell, and the trees had added considerably to their foliage. Since the last spraying much the same thing has happened, so that a large percentage of the leaves remain unsprayed, and are thus open to infection. Up to the present the sprayed plots have gained no advantage over the controls. It follows that owing to our long growing spells, spraying would require to be more or less a continuous operation in the more humid parts of the country where the benefits resulting from spraying are at present doubtful.

ROOT DISEASES.—Instances of White Root Disease on coffee have been under observation, the most important being that associated with a white scale insect, *Pseudococcus citri*, Risso., which was fully discussed in the Entomological Report for last year under the heading "Root Scale Insect." Up to that time no fructification of the fungus had been observed, but they have been numerous during the year. In some cases the sporophore grew up and enveloped the collar of the trees, whilst in others button-like sporophores were observed at various distances from the trunk, but within the radius of the lower primaries, and arising from the surface roots, which were enveloped in mycelium. The fungus is a *Polyporus* sp., not yet identified.

The remedial measures are more in the entomological sphere, although the fungus may be found on the fibrous roots not associated with the scale at these points. Three cases personally treated by Mr. Maitland by cutting off the affected roots, spraying lightly with kerosene emulsion and exposing the collar of the tree for some time, recovered.

Cacao.

Cases of cacao diseases have been much more numerous during the year, and planters are advised to adopt preventative measures systematically. This entails periodical applications of "Bordeaux" or "Burgundy" mixture, both sprayed and painted on the trunks. With the latter method, the solution should be mixed with swamp clay to the consistency of a very thin paint, and applied with a brush to the trunks and forks of the trees.

DIE-BACK, (*Lasiodiplodia theobromae*, G. et M.): (*Thyridaria tarda*, Ban.).—This disease is exceedingly common and was fully discussed in last year's report under the name *Thyridaria tarda*. The name *Thyridaria* was given to the ascigerous form of the fungus which is rare. The loss both on Cacao and Hevea is directly due to one fungus and indirectly to other causes. This fact is borne out in the majority of cases recently under observation, for such diseased wood has not been slow in producing profusely the characteristic *Diplodia* spores of *L. theobromae*.

The mycelium of this parasite travels very quickly, and the collapse of the tree may take place suddenly. It is, however, a weak parasite and enters in the wake of other fungi such as *Colletotrichum* sp., wounds caused by pruning and the wind, as well as dead tips due to exposure to sun.

A starting point being obtained for the disease, death of the tree follows unless some action is taken. The branches rapidly die, and the main stem soon becomes diseased. The discoloured tissue clearly shows the extent of the disease, and all diseased material should be carefully cut off, together with six inches below the utmost limit of the disease. Great care should be exercised in seeing that all diseased material cut off is promptly destroyed by fire.

Wounds should be protected; permanent shade established; regular spraying with fungicides adopted, so as to keep this serious disease in check.

COLLETOTRICHUM sp.—During the year this has been found affecting the tips of branches, and although it does not appear to be directly serious, indirectly its presence is taken advantage of by *L. theobromae* to gain an entrance and cause serious harm.

CANKER, (*Nectria* sp. ?)—It cannot be definitely said that *Nectria* is the cause of our canker until further work has been done. It can be more easily controlled than “die-back.” Cases which have been investigated were not wholly confined to weak and badly nourished trees, some being well-developed and having every advantage as regards soil and shade. It is not confined to the trunks of the trees, and attacks the smaller branches also, but the latter are often due to “die-back,” as the same *Nectria* occurs on branches thus killed. When the trunk is affected the flow of sap to the crown is intercepted, and this causes the topmost leaves to fall until the whole crown is involved. A well-nourished sucker can generally be produced in cases where the infection is severe and entails the cutting down of the tree.

Canker may be readily recognised by a cracking of the bark, and when cut open shows the cortex and cambium to be decayed. White or pink fruiting bodies may accompany these cracks. If observed in its early stages the diseased portions may be entirely excised, and the wounds dressed with a fungicide.

Para Rubber—Hevea.

DIE-BACK, (*Lasiodiplodia theobromae*, G. ET M.).—This has been more common during the year, although the disease is much more frequently found on cacao, and the methods of dealing with this pest, as given under cacao, are applicable to Hevea. Boring beetles follow rapidly in the wake of the disease which gives the impression that these are the cause of the trouble. Regular and careful inspection should therefore be made of Hevea, and cases where leaves and branches are dying rapidly should be suspected, although fortunately up to the present, in spite of the large area under Hevea, this disease is rarely seen.

ROOT DISEASE.—Only one case of root disease was submitted for report, where the fungus had apparently originated on old stumps and attacked the living roots of the Hevea. Examination of the material shows that but for the lack of the usual crust of soil and stones, the fungus could be put down as *Hymenochaete noxia*, Berk. It might possibly prove to be either *Fomes lucidus*, Fr., or *Fomes Australis*, Fr., and it is considered advisable to leave it as unidentified.

Cotton.

ANTHRACNOSE, (*Colletotrichum gossypii*, South).—This disease, which fluctuates according to climatic conditions, was more commonly met with during the year, although serious damage is not expected to result. Twigs, branches, stems, and bolls, are infected, and the disease appears to have been most virulent in the region of Mjanji, where Mr. J. D. Snowden, Assistant District Agricultural Officer, reported that about 80% of the bolls were attacked. All cotton plants are uprooted and burnt annually which has an excellent influence in keeping pests within reasonable limits.

Tea.

GREY BLIGHT, (*Pestalozzia guepini*, Desm.).—This attacks the leaves, producing at first small grey spots which enlarge and unite eventually involving the greater portion of the leaf. Its attack in Uganda is confined to the older leaves, and serious damage does not appear to follow.

BROWN BLOTCH OF LEAF, (*Colletotrichum camelliae*, Masee).—This appears to be more serious in Uganda than the former, producing a brown blotch on the leaf which arrests development, and the leaf curls up. It has been more prevalent on the patch of tea reserved for seed purposes, but the damage resulting is very slight.

General.

WITHER-TIP OF LEMON, (*Colletotrichum gloeosporioides*, Penzig) or a close ally.—Of the three species of citrus grown here, the orange, lime and lemon, only the last named suffers severely from this disease, although some believe that citrus wither-tip is due to physiological causes. It affects the trees so badly that they are seen to possess numerous dead tips, and in such cases sucker-like shoots grow up, which are in turn attacked and die. The leaves of the lemon are also very subject to an attack of a *Macrosporium*.

Amongst our decorative plants, two suffer from fungoid attacks, *Eranthemum* sp., from a *Colletotrichum* which causes "die-back" of the stem, and croton (*Codiaeum* sp.) from a *Colletotrichum* which attacks the leaves and stems, and in cases causing total death. Miss E. M. Wakefield states that the present forms of the above are morphologically very similar to one another, and to *Colletotrichum coffeanum*.

A number of specimens both *Phanerogamic* and *Cryptogamic* have been added to the Herbarium, and named through the kindness of the Director, Royal Botanic Gardens, Kew.

S. SIMPSON,

Director of Agriculture.

ANNUAL REPORT

OF

THE GOVERNMENT ENTOMOLOGIST.

—:O:—

SIR,

I have the honour to submit my Annual Report for the year ending March 31st, 1916.

2. I returned from leave of absence on June 14th, and the year's work was further broken by my undertaking, on account of a shortage of officers, non-entomological duties for three months.

3. The year, from the entomological point of view, was more interesting than usual, for not only were the outbreaks of insects more numerous than in preceding years, but there were several new pests, the cacao crop being the heaviest sufferer. Brief accounts of these insects are given below under the crops which they attack:—

Insect Pests of Coffee.

1. Scale Insects (*Coccidae*).

As in previous years these insects demanded attention and were responsible for considerable loss. The different species are dealt with in order of the importance of the infestations.

Coccus viridis, Green.

This pest is usually to be found on the young shoots and along the mid-rib and large veins on the underside of the leaves, in bad cases of infestation the scales overlap and may also be found on the upper surface of the leaves. The insect appears as an oval, green scale with the anterior end, as indicated by the two black eyes, pointed towards the base of the leaf or pointed downwards on the shoots. The eggs are laid under the parent scale and usually do not exceed twenty to thirty in number. The young larvæ are very active while in search of a place on the tree to settle and insert their beaks; this explains the fact that this pest spreads rapidly throughout a coffee plot from a single infected plant. It is then in the early stage that the danger of the spread of this insect is most acute, as it is not only disseminated by its own power of locomotion, but by the wind, by crawling on the feet of birds, and, most important of all, by the berry-pickers. Therefore it is at this time, for the above reason, as well as from the fact of being as yet unprotected by a scale, that remedial measures should be undertaken.

This insect is invariably accompanied by a black, sootylike fungus, *Capnodium brasiliense*, Putt., which, although innocuous, since it lives on the secretory juices of the scale insect, is unsightly. Should the fungus occur in thick layers on the leaves it is possible that it may have a harmful effect on the tree by retarding the processes of respiration and aspiration carried on by the leaves.

The pest is preyed on by two species of "lady beetles," *Chilocorus discoideus* and *C. punctate*, which play an important role in keeping it in check.

In addition to the adoption of remedial measures, such a preventative measure as the destruction of the other food plant, guava, in the vicinity of the coffee fields should be scrupulously carried out in order to minimize the risk of infestation of the coffee.

Coccus africanum, Newst.

This coccid is of equal importance to the above species which it very closely resembles; the adult female of the former differing from that of the latter in having broad unequal digitules and eight jointed antennae.

Both these species are readily controlled by whale-oil soap, or kerosene emulsion or resin wash.

Pseudococcus citri, Risso.

The female is light yellow in colour and covered with white mealy secretion. The eggs are laid loosely in white mealy secretion.

This species attacks both the foliage and the roots of coffee. When found on the roots it is always accompanied by the blind ant, *Acropyga gowdeyi*, Wheeler.

The waxy filaments covering the insect make it somewhat difficult to control this pest. Against the aerial form the most efficient spray is carbolic acid emulsion, and against the subterranean form I recommend either "Black leaf 40" (40 per cent nicotine) or a decoction of tobacco refuse.

The subterranean form is usually, if not always, accompanied by either, or both, the Brown Root fungus, *Hymenochaete noxia*, or White Root Rot fungus, *Polyporus* sp. (?).

This coccid includes amongst its food plants Cacao (pods), Citrus spp. (leaves), Dahlias (tubers).

Stictococcus gowdeyi, Newst.

The genus *Stictococcus*, the only three known local representatives of which were discovered by me, has to be reckoned with economically. The species, *St. gowdeyi*, during the year has come into prominence as a pest on this crop. It attacks the leaves and the green twigs. On the leaves the insects are arranged around the margin on the upper surface.

It is parasitized by the two new species of Chalcidids, *Coccophagus comperei*, Gir., and *Epitetrastichus ugandensis*, Gir.

Selanaspidus articulatus, Morg.

Pulvinaria psidii, Mask.

Ischnaspis longirostris, Sign.

Ceroplastes ceriferus, And.

Ceroplastes galeatus, Newst.

Ceroplastes vinsonicoides, Newst.

All the above species were submitted for advice as to remedial measures, but, with the exception of the first two species, they can still be regarded as minor pests on this crop.

Ceroplastes galeatus is parasitized by three species of Chalcidids, two of which, *Neomphaloidella ceroplastae*, Gir., and *Eurytoma galeati*, Gir., have been identified as new, and the third species *Scutellista cyanea*, Mosch.

2. Stem Borers.

Nitocris princeps, Jord.

Apate indistincta, Murr.

Apate monacha, F.

The first mentioned species has been fairly prevalent during the year. Judging by the few times it has been reported by the planters it would seem that it is scarce, the fact though is that, since the treatment, which has proved so efficient, has become generally known, it is not reported, but on the estates that were visited it was, or had been, present during the year. I have nothing to add to the accounts of its life-history, which have appeared in previous reports, beyond the fact that a Braconid has been discovered parasitizing the pupa.

The *Apate* spp., not so generally known and less prevalent than the above, have been reported more frequently.

3. The Coffee Berry Borer.

Stephanoderes coffeae, Haged.

This pest has been more serious than at any time since 1909. On plantations where the coffee is interplanted with Para rubber the infestation has been alarmingly serious, in some cases 75% of the berries were attacked. In such cases it may be that the heavy shading is responsible to some extent for the heavy infestation, but I am more inclined to the view that it is due to the system of interplanting, or, in other words, to the competition of the rubber and the coffee in which the latter suffers. Estates, also, that have suffered most are those on which the coffee is not dried by artificial means, for, since in sun dried parchment coffee the heat of the sun is insufficient to kill the insect in any of its stages, the insect continues breeding and feeding in the stored coffee, which it destroys and on emergence seeks the coffee in the field.

Although I am still unable to deal with this—in my opinion our most serious coffee pest—as I should like, it must not be concluded that no attempt is being made to cope with it.

4. Cutworms.

Agrotis spp.

Cutworms are always prevalent during the rainy season, and soon afterwards, and scarce in the dry season. Although poison baits are effective, experience makes me favour the collecting of the larvæ by small boys, who quickly become adept at it, and these means also have the advantage of being relatively inexpensive.

5. Crickets.

No reports of attacks of these insects were recorded during the year. The crickets which have hitherto been recorded as attacking this crop are *Gryllotalpa africana*, P. de B., *Gryllus bimaculatus*, de G., and *G. gracilipes*, Sauss.

6. Mediterranean Fruit Fly.

Ceratitis capitata, Wied.

I have nothing to add to the life-history of this insect. Attacks by this pest have been slight and these occurred on estates where the crop was not picked as soon as it should have been. Oranges, though, have been generally attacked, due to the fruit having been allowed to remain on the trees in an over-ripe condition as well as the fallen fruit being allowed to remain under the trees. The fallen and infested fruit should be collected and destroyed by burning or burying.

7. The Variegated Bug.

Antestia variegata, Thunb.

This bug first made its appearance as a pest on coffee during the latter part of the year and, hence, it is not possible at this stage to give in detail an account of its habits and the measures of control. It promises to be a very serious pest, as it sucks the juices from the berries, both young and old, causing them to drop.

8. A Leaf-Eating Caterpillar.

Metadrepna glauca, Hmp.

This pest has been very prevalent during the year, the outbreaks being very large. Although its presence was reported on estates West of the Nile, it is the plantations East of this river on which the outbreaks have become of such importance.

The life-history is briefly as follows:—The eggs, which are laid on either surface of the leaf, are placed on each other to form pillars, which vary in height and in number; the number of eggs in each mass varies from 25 to 100; the eggs are coral pink in colour, flattened and sub-oval in shape. The period of incubation is from six to ten days. The colour of the larva varies from dark green to brown according to the stage of its growth; the larva is readily recognized by the enlarged first segment of the body, by the tail-like prolongation of the last segment of the body and by its slug-like appearance.

At full growth, which is attained in from 16 to 21 days, it measures about two inches in length. When fully grown one—often several—larva rolls the edge of a leaf and enters into a pre-pupal stage, in which it remains for from four to six days, and then enters the pupal stage. The moth emerges from the pupa in about 10 to 13 days. The moth is a small, brown, inconspicuous insect, having a wing expanse of $1\frac{1}{4}$ inches.

The larvæ are extremely rapacious and are capable of defoliating a large acreage of coffee trees with astonishing rapidity. They devour all the tissues of the leaf leaving the midrib; in bad cases of infestation the berries are attacked after the complete defoliation of the trees.

Since the larvæ are such greedy feeders they are easily killed by a stomach poison. Paris Green and arsenate of lead were the stomach poisons used. In spite of the fact that these insects are so readily killed, most of the outbreaks were allowed to get out of hand, with the result that in some cases the loss on the following crop of berries was great. The reasons of the outbreaks getting out of control were that the planters, considering that collecting the larvæ would suffice to check the outbreak, did not report it until the pest had become well established, and when the remedial measures were recommended they had no insecticides quickly available.

The eggs are parasitized by a small wasp (*Chalcididae*).

Insect Pests of Cacao.

1. Scale Insects.

Inglisia conchiformis, Newst.

This is a new pest on cacao. Only once, though, has it been reported. It attacks both the pods and flower-buds. The parasitic moth, *Eublemma scitula*, Ramb., is invariably found attacking this coccid.

Stictococcus divirsiseta, Silv.

This continues to be the worst scale insect on this crop. Several spraying experiments have been carried out, the results of which appeared in the "Annals of Applied Biology," 1, p. 399 (1915).

In addition to any spraying operation which may be undertaken against this insect on cacao, similar operations should be carried out against it on any of its food plants in the vicinity of the cacao, or the destruction of such plants. The food plants are croton, *Hibiscus*, custard apple, mulberry, pigeon pea, and "Nsambya."

Pseudococcus citri, Risso.

This mealy bug also attacks cacao pods as well as coffee, under which heading the insect has been dealt with.

2. The Mosquito Blight.

Helopeltis bergrothii, Reut., var.

As a pest of cacao this bug is of recent appearance; but in view of the loss of pods, largely young ones, it bids strongly to be the worst of our insect pests of this crop. The damage is caused by this insect in both the nymph and adult stages by its sucking the juices from the pods and tender shoots.

When the young pods are attacked they shrivel up, but do not drop; when matured pods are attacked the pulp around the beans is often attacked by a saprophytic fungus. The external effect on pods of any degree of ripeness is the formation of black, sunken patches caused by the decay of the tissues around the point of insertion of the insect's beak.

The eggs are laid singly in the interior of the young shoots and pods and their presence is indicated by a thread-like process projecting from the stem or pod. The number of eggs laid by a single female varies from 25 to 35. The eggs are curved somewhat, elongate-oval, white. The nymphs emerge from the eggs in about 10 days, and molt five times before attaining full growth, which takes about 16 days. The adults may live for two or three months. The adults are to be found in larger numbers in the rainy season than in the dry season.

Owing to the ease with which these insects are disturbed and their agility when disturbed, the search for a means of controlling this pest is being carried out more on the lines of obtaining a deterrent than the adoption of a contact insecticide. Applying a layer of "Tanglefoot" to the pods has been tried but, although it has been favourably reported on, it has not been tried often enough for safe deduction as to its value to be made.

3. Cacao Fruit Fly.

Ceratitis punctata, Wied.

No report of attacks of this insect has been received. Adults were bred from mangoes.

4. A Boring Beetle.

Kyleborus sp. (?).

As a rule these insects are found in dead wood, but often they are found in living wood, preferably though in diseased tissue. They are often found in trees suffering from "die-back."

5. The Cacao Beetle.

Adoretus hirtellus, Castn.

This beetle is met with on all the cacao plantations throughout the country and is often responsible for the backwardness of young cacao owing to its defoliations.

6. The Cacao Aphis.

Toxoptera theobromae, Schout.

This species attacks the tender leaves and flowers. The effect of the attacks on the foliage is to cause the leaves to curl as a result of the absorption of the sap from the undersides of the leaves. In the case of young trees the absorption of a large amount of sap results in the trees being stunted. When the flowers are attacked they fall off, which results in a decrease in the pod production.

Tobacco decoctions, kerosene emulsion or whale oil soap is the usual treatment.

7. *Plataspis vermicellaris*, Stål.

One case is on record of this bug attacking cacao branches. It is, though, commonly met with on the tree *Erythrina indica*, which is used as a shade tree for cacao.

8. The Cacao Girdler.

Sthenias cylindrator, F.

Several specimens of this beetle were received during the year together with samples of its work. It completely girdles or ring-barks twigs with a maximum diameter of about three-fourths of an inch. The result of this girdling is, of course, that the part of the branches beyond the point at which it is girdled dies.

9. Leaf-Eating Caterpillars.

The larvæ of two species of moths, one a Saturniid and the other *Parasa* sp. (?), were reported as defoliating this crop.

Insect Pests of Cotton.

The usual insects which attack cotton in this country were as prevalent as hitherto, with the exception of the stainers, both *Dysdercus* and *Oxycaraenus* spp., which judging from the stained cotton being sold in parts of Bukedi must have been in unusually large numbers in that district.

Boll Worm.

The Boll worm, *Earias insulana*, was apparently more prevalent in Busoga than usually, or it may only be that I consider that there is an increase of this insect because I happened to make an extended tour through this district and personally observed the damage.

The larvæ of this species are extremely variable in colour; the variation is so great that it may be that we have more than one species.

Miscellaneous Pests.

Aspidiotus cyanophylli, Sign.

This scale insect has occurred very generally on bananas, principally on the fruit.

Pseudococcus bromeliae, Bouché.

This coccid attacks pineapples; it is found on the roots, at the base of the leaves and in the "eyes" of the fruit.

Locusts.

Three swarms of locusts were reported during the year.

WESTERN PROVINCE.—In April, 1915, a swarm visited Nyakabimba and passed through the north-east of Mwenge and part of Kitagewta coming from Kagera, *via* Mbarara, and proceeding in a northerly direction. The damage was reported to have been inconsiderable. The previous swarm in this district is said to have occurred some fifteen years ago.

EASTERN PROVINCE.—Two swarms occurred in this Province during March, but were not reported until April, 1916. One swarm came from Karamoja, passed over Kumi and Ngara and finally settled in Bukidea. The other swarm came from the south-east and settled in Usuku County. The latter swarm was reported as being half a mile long and the damage to have been great.

Visits to Estates.

4. Twenty-two estates were visited within a period of seven months.

The Collection.

5. The collection of insects numbers nearly six thousand species.

The following insects were donated to the Imperial Bureau of Entomology:—

Ixodoidea	....	....	....	....	30
Thysanoptera	....	....	....	....	11
Isoptera	....	....	....	....	50
Orthoptera	....	....	....	....	55
Coccidae spp.	....	....	....	....	10
Aphidae spp.	....	....	....	....	3
Rhynchota, Other	....	....	....	....	675
Diptera	....	....	....	....	63
Coleoptera	....	....	....	....	1,407
Lepidoptera	....	....	....	....	16
Hymenoptera	....	....	....	....	787

TOTAL 3,107

Imports of Plants.

6. One hundred and seventeen consignments of plants and seeds were examined during the year.

Kampala Museum.

7. The exhibits of native curios and handiwork have not been increased, but they have been re-arranged and printed labels affixed. It is intended that there shall be a collection of economic products in this building as well and I have already begun utilizing the small space that is at present available.

I have the honour to be,

Sir,

Your obedient servant,

THE DIRECTOR OF AGRICULTURE,
KAMPALA.

C. C. GOWDEY,
Government Entomologist.

Estimated Number of Live-Stock in the Protectorate.

Province and District.			Horses.	Mules.	Donkeys.	Cattle.	Sheep.	Goats.
BUGANDA:—								
	Mengo	...	2	?	18	41,294	10,136	77,933
	Entebbe	...	—	—	6	1,521	698	7,239
	Masaka	...	—	1	13	68,524	13,692	42,173
	Mubendi	...	—	2	—	8,000	4,300	24,500
	TOTAL	...	2	3	37	119,339	28,826	151,845
EASTERN:—								
	Busoga	...	—	1	30	39,000	18,000	45,000
	Bukedi	...	—	4	40	55,000	42,000	122,000
	Teso	...	—	—	40	132,853	38,746	93,413
	Lango	...	—	1	10	23,626	21,414	48,533
	Karamoja	}	...					
	Labor							
	TOTAL	...	—	6	120	250,479	120,160	308,946
NORTHERN:—								
	Masindi	...	—	2	3	2,062	1,864	11,560
	Hoima	...	—	—	2	5,334	1,729	7,345
	Gulu	...	—	1	10	?	?	?
	Chua	...	—	1	100	10,000	7,000	30,000
	West Nile	...	—	3	3	50,000	40,000	80,000
	TOTAL	...	—	7	118	67,396	50,593	128,905
WESTERN:—								
	Toro	...	—	1	13	31,747	11,767	31,150
	Ankole	...	1	—	6	230,000	50,000	250,000
	Kigezi	...	—	4	—	?	?	?
	TOTAL	...	1	5	19	261,747	61,767	281,150
RUDOLF:—								
	Turkwell	}	...					
	Turkana							
	Dabosa							
	but the				No basis for an estimate, number known to be very great.			
	GRAND TOTAL	...	3	21	294	698,961	261,346	870,846

Native Agriculture.

Appendix 2.

Province and District.	Beans.	Chillies.	Cacao.	Coffee.	Cotton.	Cassava.	Indian Corn.	Millets.		Wheat.	Plantains.	Dhal.	Rubbers.		Rice.	Sugarcane.	Potatoes.		Tobacco.	Onions.	
								Matama.	Wimbi.				Para.	Ceara.			Sweet.	English.			
ACRES.																					
BUGANDA :—																					
Mengo ..	500	50	?	3,000	18,000	?	1,000	150	150	10	390,000	200	1,000	1,000	100	4,500	1,750	?	180,000	?	
Entebbe ..	1,256	14	5	1,026	2,482	2,132	5,550	100	100	..	32,490	73	43	1,145	37	977	311	?	17,741	38	
Masaka ..	?	?	?	3,850	5,496	?	?	570	570	14	120,000	?	15	?	?	1,400	1,190	?	15,250	?	
Mubendi ..	6,000	20	?	250	830	50	500	9,000	9,000	..	11,500	100	..	50	..	2,000	200	50	13,500	10	
TOTAL ..	7,756	84	5	8,126	26,808	2,182	7,050	1,920	9,820	24	553,990	373	1,058	2,210	137	8,877	3,451	50	226,491	48	
EASTERN :—																					
Busoga ..	?	?	..	10	15,000	?	?	?	?	?	?	?	..	..	..	?	?	?	?	?	
Bukedi ..	?	..	..	65	12,492	..	?	?	?	..	6,000	?	..	..	50	3,000	?	?	30,000	20	
Teso ..	35,000	..	..	3	30,674	3,000	2,000	45,000	60,000	..	6,000	..	..	..	50	3,000	30,000	?	30,000	?	
Lango ..	19,370	..	..	..	6,288	327	914	61,627	119,534	..	325	31,932	..	..	3	137,251	7,294	11	863	69	
Karamoja } Lobor }																					
TOTAL ..	54,370	..	..	78	64,454	3,327	2,914	106,627	179,534	..	6,325	31,932	..	50	113	140,251	37,294	11	30,863	21	
NORTHERN :—																					
Masindi ..	1,900	..	..	100	600	..	1,000	100	6,000	..	4,000	1,000	..	..	..	2,000	100	?	15,000	..	
Holma ..	1,200	..	..	25	265	10	550	400	3,400	..	1,700	..	..	10	..	590	30	10	3,600	20	
Gulu ..	?	..	..	5	..	..	?	?	?	..	?	?	..	..	1	?	?	..	?	?	
Chua ..	?	..	..	..	..	..	?	?	?	..	?	?	..	..	..	?	?	?	?	?	
West Nile..	4,200	..	..	..	..	50	100	32,000	43,000	..	?	?	..	..	..	11,000	800	?	1,300	20	
TOTAL ..	7,300	..	..	130	865	60	1,620	32,500	52,400	..	5,700	1,000	2	10	1	13,590	930	10	19,900	40	
WESTERN :—																					
Toro ..	20,000	..	..	60	..	500	1,000	30,000	30,000	700	12,000	2,000	..	..	3	1,000	800	400	10,000	5	
Ankole ..	10,500	..	..	70	..	100	525	1,575	1,650	10	25,625	10,500	2	3	..	100	500	15	21,000	104	
Kigezi ..	35,000	..	..	..	..	..	?	20,000	20,000	25	2,500	75,000	..	..	..	..	..	?	5,500	100	
TOTAL ..	65,500	..	..	130	..	600	1,525	22,575	51,650	735	40,125	87,500	2	3	3	1,100	1,300	415	36,500	63½	
RUDOLF :—																					
Turkwell } Turkana } Dabossa }																					
GRAND TOTAL ..	134,926	84	5	8,404	92,127	6,169	13,109	163,022	293,404	759	606,140	120,805	1,062	2,273	254	163,818	42,975	486	313,754	138	
																				5,520	

Appendix 3.

European Agriculture.

Compiled from Returns of 157 Plantations.

Province and District.	Number of Estates.	Total area under Cultivation in acres.	Acreage of Coffee <i>Arabica</i>		Acreage of Coffee <i>Robusta</i>		Acreage of Coffee and Para		Acreage of Para		Acreage of other Rubbers		Acreage of Cacao		Acreage ready for Cacao.	
			under 2 years.	over 2 years.	under 2 years.	over 2 years.	under 2 years.	over 2 years.	under 5 years.	over 5 years.	under 5 years.	over 5 years.				
BUGANDA :—	...	15,058	693	5,082	5	64	188	3,588	296	1,018	454	247	2,779	138	306	
	Entebbe	...	1,831	12	488	—	—	50	494	—	50	33	—	436	21	44
	Masaka	...	1,356	3	869	—	5	—	167	—	—	—	—	162	—	19
	Mubendi	...	825	60	763	—	—	—	—	—	4	1	—	31	—	20
TOTAL ...			19,070	768	7,202	5	69	238	4,249	296	1,072	488	247	3,408	159	389
EASTERN :—	...	2,875	288	1,522	—	—	—	—	200	32	—	—	25	504	—	162
	NORTHERN :—	...	1,857	730	518	—	160	—	60	—	—	—	—	175	—	36
Hoima		...	464	90	130	—	—	—	—	—	—	—	—	—	—	100
TOTAL ...			2,321	820	648	—	160	—	60	—	—	—	175	—	136	
WESTERN :—	...	918	395	519	10	20	—	—	—	—	—	—	26	—	2	
	Toro															
GRAND TOTAL		..	25,184	2,271	9,891	15	249	238	4,509	328	1,072	488	272	4,113	159	689

Mission Cultivation.

PROVINCE.	Coffee <i>Arabica</i> .	Coffee <i>Robusta</i> .	Para.	Other Rubbers.	Cacao.	Cotton.
Acres.						
BUGANDA ...	621	26	169	115	117	15
EASTERN ...	52	—	—	5	20	12
NORTHERN ...	91	—	—	1	—	—
WESTERN ...	24	—	—	—	—	—
TOTAL ...	788	26	169	121	137	27

Appendix 4.

Cotton Ginneries.

Nineteen Power Ginneries are now at work:—

Eastern Province	...	...	...	...	11
Buganda Province	...	...	...	...	7
Northern Province	...	...	...	...	1

Particulars of Machinery.					Total.
Power Roller Gins	...	...	...	...	180
„ Saw „	...	...	...	...	33
„ Baling Presses	...	...	...	...	18
Seed Openers	...	...	...	...	16
Delinters	...	...	...	...	3
<i>Kind of Power:—</i>					
Steam	...	...	...	...	3
Oil	...	...	...	...	9
Suction Gas	...	...	...	...	8
* Hand Gins	...	...	...	...	70

* Very few of the Hand Gins are in use.

IMPERIAL INSTITUTE OF THE UNITED KINGDOM,
THE COLONIES, AND INDIA.

Report on Cocoa from Uganda.

Description of Sample.

The sample weighed 18 ozs., and consisted of cocoa beans varying in size from large to very small, together with some undeveloped and broken beans. Most of the beans were fairly plump, but a large number, especially of the smaller beans, were thin.

The beans mainly varied in colour from cinnamon brown to dark brown, but a small number were of a purplish-brown tint. The break was easy, and in most cases of good colour, though in a few cases it was slaty. The cocoa possessed a good aroma, and a fairly full taste free from harshness.

Results of Examination.

After removal of the husks, which amounted to 7·3 per cent by weight of the beans as received at the Imperial Institute, the beans were submitted to examination with the following results:—

				per cent.
Moisture	...	...	...	4·9
Total alkaloid	...	...	...	1·7
Fat ...	...	...	...	47·2
Ash ...	...	...	...	3·2

These results indicate that the composition of the beans was normal.

Commercial Valuation.

A graded sample consisting of fairly large and undamaged beans was prepared at the Imperial Institute from the original sample, and this together with some of the ungraded beans was submitted for valuation to brokers and manufacturers, who reported as follows:—

The brokers described the graded sample as an excellent cocoa, well fermented and of good flavour, adding that the thinness of the shells was an advantage. They valued the product at 76s. to 78s. per cwt., in Liverpool (May, 1915).

The firm considered the ungraded cocoa to be of rather lower value, *viz.*, from 74s. to 76s. per cwt., in Liverpool, owing to the presence of the smaller beans.

The manufacturers stated that the market value of the graded beans would approach that of good Grenada cocoa, though neither sample was so well fermented as the latter variety. They added that this class of bean cannot in their opinion be fermented to produce a really high class cocoa of mild character, and they considered that the best results would be obtained by fermentation for five or six days in the West Indian manner.

It must be pointed out in connection with the above reports that the prices realised for cocoa at the present time are exceptionally high, "common or fair" Grenada cocoa being quoted at from 77s. to 78s. 6d. per cwt., in the United Kingdom (June 2nd, 1915).

Conclusions.

These results indicate that this cocoa from Uganda would be readily saleable in the United Kingdom at good prices.

10th June, 1915.

IMPERIAL INSTITUTE OF THE UNITED KINGDOM,
THE COLONIES, AND INDIA.

**Results of the Examination of Lulu Kernels
from Uganda.**

Imperial Institute No.	425/1916.
Reference	Letter No. 1352/345, dated 11th December, 1915, from the Director of Agriculture.
Number or mark, and weight of sample	Kernels from the Kitgum District. Weight 46 lbs.
Description	The sample consisted of brown kernels having the appearance of Shea kernels (<i>Butyrospermum Parkii</i>). The kernels were in good condition although a few were attacked by insects. Their dimensions varied from $\frac{3}{4}$ to $1\frac{1}{4}$ inches in length, $\frac{5}{8}$ to $\frac{7}{8}$ inch in breadth and $\frac{3}{8}$ to $\frac{3}{4}$ inch in thickness. The average weight of a single kernel was 3.7 grams.
Yield of oil	53.9 per cent from kernels containing 5.2 per cent of moisture, equivalent to 56.9 per cent expressed on the dry kernels.
Character of oil	A cream-coloured solid fat, having the usual appearance of Shea butter and melting at 26° to 27°C.
Commercial valuation	These kernels are of good quality, but smaller in size than those in previous samples of kernels received at the Imperial Institute from West Africa and of about the same size as kernels previously received from Uganda and the Sudan. The yield of oil is good, previous samples of Shea kernels examined at the Imperial Institute having furnished from 41.4 to 54.5 per cent of oil, expressed on the kernels as received. The demand for Shea kernels is somewhat irregular, and prices have varied in recent years from about £10 to £13-15-0 per ton. Kernels of the quality represented by the present sample, if shipped in commercial quantities, would fetch about £12 per ton in Liverpool under present conditions (April, 1916). 17th April, 1916.

IMPERIAL INSTITUTE OF THE UNITED KINGDOM,
THE COLONIES, AND INDIA.

**Results of the Examination of Lulu Oil (Shea Butter)
from Uganda.**

Imperial Institute No.	425/1916.			
Reference	Letter No. 1352/345, dated 11th December, 1915, from the Director of Agriculture.			
Number or mark, and weight of sample	“ Oil prepared from the nut of the Lulu tree. Native method.” Weight 1½ lb.			
Description	The sample consisted of a soft cream-coloured fat having the characteristic odour of Shea butter It contained 0·1 per cent of impurity, together with traces of moisture, and possessed a somewhat “ burnt ” smell.			
Results of examination		Present sample.	Previous samples examined at the Imperial Institute.	
	Specific gravity at 100°-15°C	0·8630	0·8594	— 0·8691
	Solidifyingpoint of fatty acids	48·5	51·8	— 52·0
	Acid value	2·6	5·3	— 33·9
	Saponification value	186·0	179	—184·6
	Iodine value, per cent	63·0	55·8	— 62·9
	Hehner value....	—	—	— —
	Unsaponifiable matter per ct.	2·6	1·7	— 7·0
	Volatile acids, soluble	—	—	— —
	Volatile acids, insoluble	—	—	— —
	Melting point....	28°- 29°C.		
Commercial valuation	See Appendix 8.			

IMPERIAL INSTITUTE OF THE UNITED KINGDOM,
THE COLONIES, AND INDIA.

**Results of the Examination of Lulu Oil (Shea Butter)
from Uganda.**

Imperial Institute No.	845/1916.			
Reference	Letter No. 42/345, dated the 7th January, 1916, from the Director of Agriculture.			
Number or mark, and weight of sample	"Shea Butter from West Nile District from Acting P.C., N.P., Masindi." Weight 6 ozs.			
Description	The sample consisted of a soft buff-coloured fat a little darker in tint than the preceding sample. The fat had the characteristic odour of Shea Butter. It contained only a trace of dirt and moisture, and possessed a somewhat "burnt" smell.			
Results of examination		Present sample.	Previous samples examined at the Imperial Institute.	
	Specific gravity at 100°-15°C.	....	0.8636	0.8594— 0.8691
	Solidifying point of fatty acids	....	—	51.8 — 52.0
	Acid value	....	4.5	5.3 — 33.9
	Saponification value	187.5	179	—184.6
	Iodine value, per ct.	61.2	55.8	— 62.9
	Hehner value	....	—	—
	Volatile acids, soluble	—	—	—
	" " insoluble	—	—	—
	Melting point	28°-29°C.		
Commercial valuation	Both this and the preceding sample of fat are of good quality. The "burnt" smell is quite usual in native-prepared Shea Butter, and is due to the native method of preparation.			
	The demand for Shea Butter is irregular, but the product as prepared by natives in West Africa sells at about £30 per ton in Liverpool in normal times and has recently been quoted in that market at £41 per ton (April, 1916), and this Uganda product would fetch about the same prices as West African Shea Butter if it were placed on the market in quantity.			
	17th April, 1916.			

Appendix 9.

Comparative Statement of Exports connected with Agriculture.

ARTICLES.	Unit.	Year ended 31st March, 1912.		Year ended 31st March, 1913.		Year ended 31st March, 1914.		Year ended 31st March, 1915.		Year ended 31st March, 1916.	
		Quantity.	£	Quantity.	£	Quantity.	£	Quantity.	£	Quantity.	£
Coffee Husked	cwts.	1,712	2,563	3,336	8,940	12,252	23,167	{ 2,103 18,998	5,542	8,691	22,714
" in Parchment	"	13,643	16,658	10,599	12,408	7,205	8,247	5,116	35,463	34,547	64,488
Chillies	"	9,155	4,279	11,780	5,570	7,671	3,740	156	5,835	8,333	16,850
Groundnuts	"	2,911	5,819	4,737	11,439	4,851	12,507	4,693	76	1,693	822
Ghee (Clarified Butter)	"	289	226	319	301	216	193	265	12,264	4,591	11,999
Jaggree (Unrefined Sugar)	"	13,855	7,048	31,402	16,812	17,919	10,449	8,514	159	551	329
Simsim Seed	"	59,277	184,639	77,728	214,170	85,217	272,366	107,139	4,764	39,261	21,986
Cotton Ginned	"	45,664	46,211	48,538	40,209	44,130	45,321	30,188	320,486	91,231	239,483
" Unginned	"	58,549	5,909	112,283	11,335	134,128	13,499	180,334	33,660	8,110	5,943
" Seed	"	3,539	162	2,352	117	882	42	350	18,172	104,498	9,760
Beeswax	lbs.	9,032	26,191	12,878	45,854	13,837	52,926	38,138	17	42	2
Hides	cwts.	31,024	4,117	27,216	3,647	10,416	1,107	—	54,917	18,130	63,467
Rubber, Wild	lbs.	2,102	325	4,474	834	19,454	2,934	22,056	—	5,538	554
" Plantation	"	581,615	22,249	573,852	28,543	464,987	29,037	864,384	1,838	52,349	4,332
Skins (Goat)	No.	77,964	1,559	83,989	1,940	59,644	1,615	22,178	19,091	391,290	18,260
" (Sheep)	"	225	705	847	2,941	1,052	4,204	732	506	10,144	169
" (Calf)	"	—	4,979	—	7,994	—	582	—	2,710	612	2,227
Miscellaneous	cwts.	3,213	3,776	583	716	—	—	21	558	—	261
Cotton Seed Oil	cwts.	—	—	7	12	36	—	3	25	725	870
Simsim Oil	"	3	75	—	—	—	71	—	6	134	250
Horses	"	8	207	—	—	—	—	—	—	—	—
Mules	"	450	601	—	—	—	—	—	—	—	—
Donkeys	"	382	1,144	1,516	6,205	—	—	13	17	125	334
Cattle	"	710	474	632	428	246	1,006	266	789	836	3,025
Miscellaneous Live Stock	"	—	1,954	—	3,333	—	—	—	—	—	—
Miscellaneous	"	—	—	—	—	—	3,792	12	12	14	1
GRAND TOTAL	...	£341,870	£423,752	£486,223	£516,907	£488,156	...	...	...	...	...